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MOTOR AGE

Volume XXXV
Number 25

PUBLISHED WEEKLY AT THE MALLERS BUILDING
CHICAGO, JUNE 19, 1919

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Three Dollars a Year

WOULDN'T YOU LIKE

A Few Territories Are Still Open

TO SELL THE ESSEX

Sell a car that people want. It is not profitable if every sale made comes as a result of beating down resistance.

The Essex has made good. Everyone knows that. It is the kind of car people have long wanted. Note what people are saying.

Close to half a million friends now praise it. People say that never before has such comfort, elegance and performance been found in any except the largest and most expensive cars.

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Essex dealers are booked ahead with orders. But production is daily increasing. The growing popularity of the Essex assures a buyer for every car we can produce for months to come.

But we want Essex cars placed in every locality. As the output goes up it will have made a way for itself.

If you had the Essex for your territory and even if you could not get all the cars you need just now, still you would be planting the seed for a great future business.

Doesn't that interest you? If it does, don't delay. Perhaps there is an opening for you.

ESSEX MOTORS DETROIT USA

Entered as second-class matter Sept. 19, 1899, at the post-office at Chicago, Ill., under act of March 3, 1879

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Who Stock The New

UTILITY UNIVERSAL RIM WRENCHES

Need Carry No Others

Price
$1.75

Made In Only One Size

—because it does by itself everything that a big assortment of fixed rim wrenches could do.

There is no need to crowd your stock—or tie up your money—in a dozen different wrenches, when one New UTILITY Rim Wrench sells faster, and does the work of all.

Fits Every Nut
On Every Rim

The New UTILITY Universal Rim Wrench is made in only one size. It adjusts itself **automatically** to fit any nut, holds it fast, and turns like a bit and brace.

No chance to make a mistake and sell the wrong sized wrench. No danger of carrying dead stock or supplying a misfit wrench when size of nuts on some make of rim is changed.

May be used all over the car, as well as on the rims. **Absolutely Guaranteed.** A big seller that **saves money and time,** and gives **universal service** at extremely low cost. Price complete, only **$1.75.**

DEALERS: Order from your jobber. JOBBERS: Get in touch with us.

HILL PUMP VALVE COMPANY

Mfrs. of UTILITY Protected Heaters, UTILITY Pedals for Fords, UTILITY Pumps, UTILITY Disappearing Truck Bodies for Fords, UTILITY Universal Rim Wrenches and UTILITY Universal Wrenches.

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MOTOR AGE

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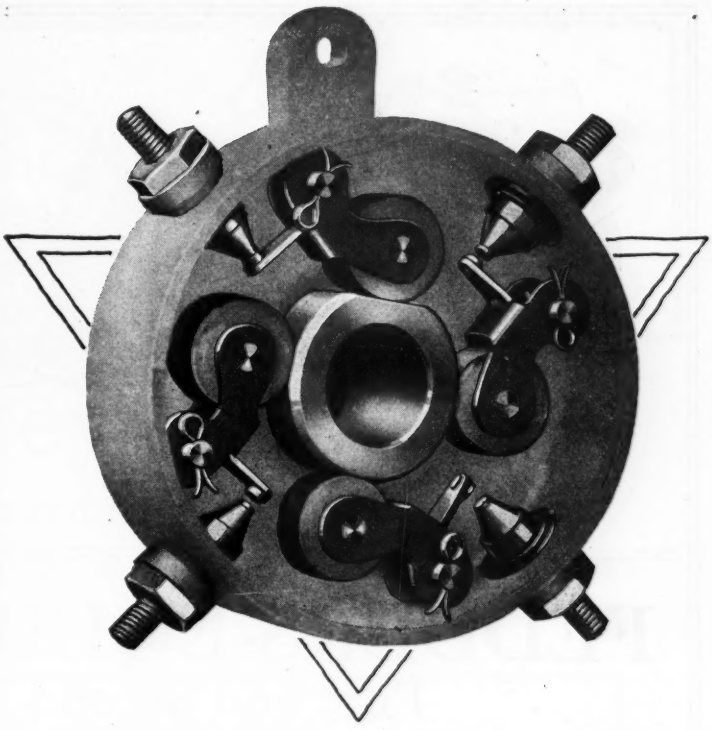

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MAGNETO BREAK
TIMER
FOR ALL FORD CARS

Overcomes Every Timer Trouble

This timer is designed and built so it **can't** go wrong. Mechanically, it is as near perfection as an article of this kind can be made.

Its fiber rollers, in addition to their superior wearing qualities, eliminate the necessity for oil. They are a feature with which **all** timers **should** be equipped.

There are no sliding contacts to become insulated with oil; the positive contact overcomes starting troubles; the tungsten points will not pit or burn; positive timing on all cylinders; interchangeable on regular Ford fittings. Tests show remarkable savings in fuel.

FOR FORDSON TRACTORS

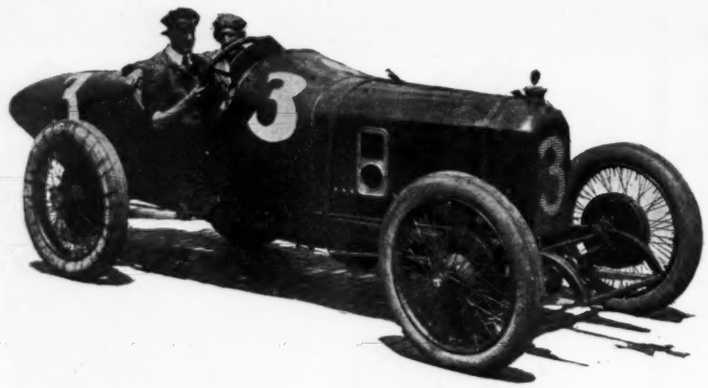
The following letter tells the experience of a Fordson Tractor owner, who uses a Duntley Magneto Break Timer.

"The timer you sent . . . . is all you claim for it. It certainly gives the tractor twice the power it had before and also is a saver of fuel." Name on request.

SOLD ON AN ABSOLUTE MONEY BACK GUARANTEE

Dealers—Write for our sales proposition

JACK DUNTLEY
1004 Michigan Ave. CHICAGO, U. S.



Howard Wilcox in his Peugeot
Winner of the Race

Eddie Hearne in his Durant
Special Second in the Race

FEDDERS-EQUIPPED CARS WIN

First and Second in Indianapolis Race

On the hottest day in the history of Indianapolis 500-mile Races, Howard Wilcox drove his Peugeot to victory at 87.12 miles per hour, and Eddie Hearne finished second in his Durant Special—both cars equipped with Fedders stock Radiators.

Indianapolis, June 5th, 1919.

Fedders Mfg. Co. Inc.
Buffalo, N. Y.

Gentlemen:—

I have been using Fedders Radiators on my racing cars for ten years and my Peugeot winning the 500-mile grind last week was so equipped. Government records show this day was the hottest day in the history of 500-mile contests here.

While the Fedders Radiator I used was about two and one-half years old and had been through many races, there was no doubt in my mind at any time about this radiator.

I put it on and simply forgot it, as I knew that I would not lose any time owing to radiator trouble.

Wishing you continued success in building your A-1 radiator, I remain,

Yours very truly,
HOWDY WILCOX.

Fedders Radiators are not made to win races; they win races because of the way they are made — —

Supreme in Cooling Efficiency and Durability

Fedders Mfg. Co., Inc.
Buffalo, N. Y.

FEDDERS
Automotive Radiators

Vol. XXXV, No. 25 Chicago, June 19, 1919 $3.00 Per Year

MOTOR AGE

Does Money Talk?

Dealers Who Have Departmentized Their Businesses Prove Success of Intensive Merchandising by Their Books

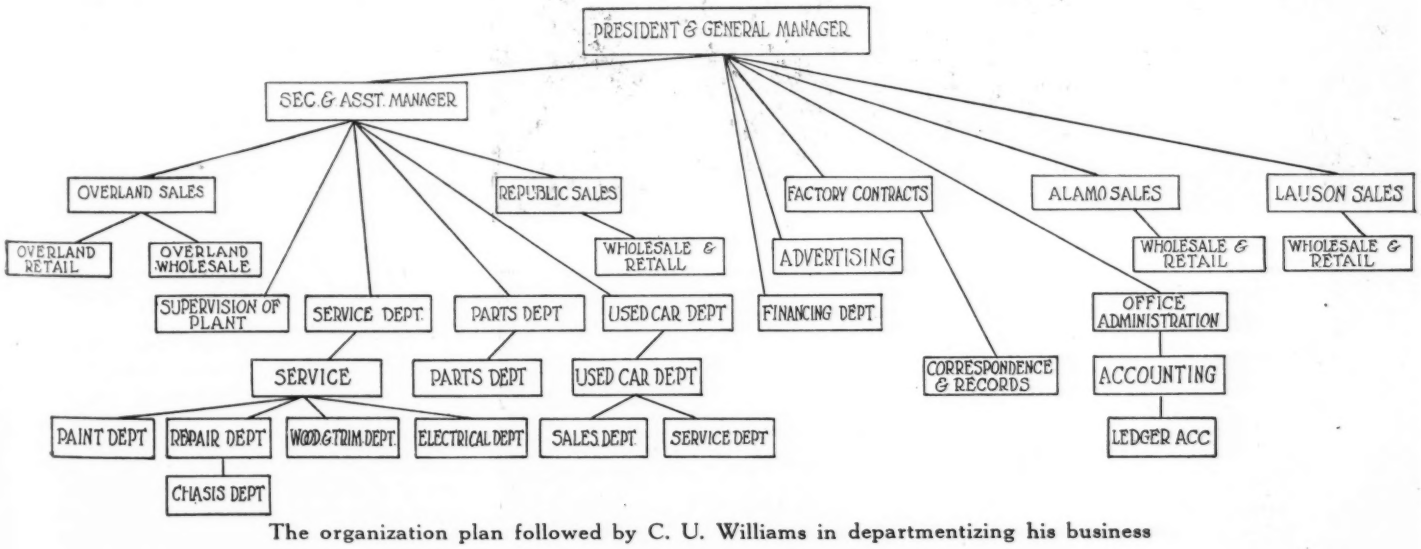
1—*An annual business of* $20,000 *on an automotive accessory stock in a town of* 3000 *inhabitants.*

2—*An annual tire business of* $78,000 *in a town of* 4000.

3—*Total sales of* $208,000 *in a town of* 12,000.

4—*Annual sales of* $86,000 *in cars alone in town of* 5000.

5—*Increase of* 66 2-3 *per cent attributed to departmentizing.*



The organization plan followed by C. U. Williams in departmentizing his business

1—How Swaney Proved It

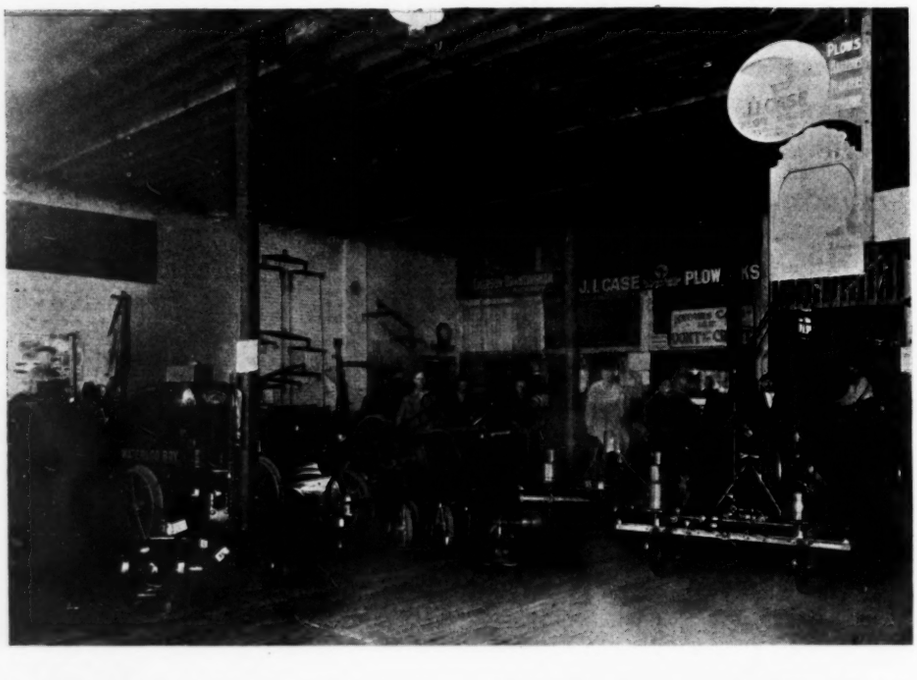
AN annual business of $20,000 on an automotive accessory stock in a town of 3000 inhabitants is fairly good business, isn't it? Or an annual tire business of $78,000 in a town of 4000 is mighty fine, isn't it?

Yet these records were made last year in the Swaney organization out in Iowa by departmentizing and putting competent men at the head of the departments.

At Jefferson, Iowa, E. F. Raver was put on his mettle to show what he could do with an accessory stock. The Jefferson business, known as the Jefferson Motor Co., is a branch of the Swaney Automobile Co., Carroll, Iowa, one of the six similar institutions operated by Swaney.

Jefferson is a small town of only about 3000 inhabitants, and there are perhaps half a dozen motor car concerns there, all carrying some accessory stock. The Swaney branch has the best and most attractive building in which to do business and has an attractive and well arranged accessory room adjoining the office. Swaney wanted to see what specialization would do, so he put Raver at the head of the department and told him to go to it.

No special inducements were made to attract trade other than keeping the place clean and in order and the stock



These three views are from the establishment of the Crary company. The accessory and parts department is shown at the bottom, the tractor department in the center, with at top a view in the car department. This company's total sales last year were $208,000

full and up to date. These won, and at the end of the year Raver showed a total business in motor car accessories of $20,000.

About the same time Swaney began the Jefferson experiment he put a special tire man at work at the home office of the organization at Carroll with instructions to boss the tire business of all six of the Swaney branches. This man rolled up a tire business during 1918 amounting to $78,000. And yet there are dealers who have not yet seen the wisdom of departmentization and specialization.

But these were only experiments and only for one department of the business. It is equally successful and profitable to extend the plan.

2—Crary's Case

TAKE the case of the Crary Motor & Implement Co., Boone, Iowa. Crary practically has departmentized his whole business, but virtually only two of the departments are headed by a special man. These are the tractor department, of which G. E. Lebo has charge, and the parts and accessory department, under the direction of W. M. Van Der Karr.

During 1918 Crary's tractor department sold a total of $35,297.32. Of the forty-three tractors which the company has out, Lebo has to his personal credit, since he took over the department, twenty-three.

Van Der Karr ran the sales in his department up to $36,064.11.

Boone is a town of 12,000 population and the Crary company, while easily the biggest thing there in the automotive line, has plenty of competition.

Last year the Crary Motor & Implement Co. sold a total of $208,000. In round numbers each of the several de-

partments contributed to this total as follows:

Motor cars	$100,000
Parts and accessories	36,000
Auto sundries	9,000
Tractors	35,000
Horse-drawn vehicles	6,500
Implements	21,500
Total	$208,000

3—Rude Knows

OR, if any further proof of the advantage of departmentizing a business is needed, take the case of the Rude Auto Co., Perry, Iowa. This business is completely departmentized, with a man at the head of each department who is held responsible for the conduct of, and the results from, his department.

During 1915 the business was conducted in the ordinary way, just as thousands of other motor car concerns are conducted. Everything went into one pot, and every man about the place had a finger in that pot. Lloyd Edson, who was manager of the business at that time, was not satisfied with the way things were going, so he decided to departmentize and go into intensive merchandising to see what the results would be. The following comparison, between what the business was in 1915 under the old plan, and what it was in 1918 under the departmentized plan, is illuminating and conclusive:

	1918	1915
Parts	$13,000	$1,300
Accessories	25,000	5,000
Tires and tubes	25,000	5,000
Used cars	35,000	6,000
Oils and greases	5,000	700
Repair	10,000	3,000
Special bodies	11,000	....
Storage	1,500	700
New cars	86,000	18,000
Total	$211,500	$39,700

Taking one item alone, cars, the annual increase of business is shown by the following figures:

Year	Sales
1915	$18,000
1916	36,000
1917	68,000
1918	86,000

Nor is the last comparison fair for 1918, because everybody knows what happened to the new car supply in that year.

Two-Thirds of Gain

Edson figures a business should show an annual increment of business increase of about 33 1/3 per cent. He claims, therefore, that fully 66 2/3 per cent is attributable to departmentization and intensive merchandising. And this result was accomplished in three years in a town of only 5000 inhabitants.

These figures, taken directly from the records of the companies, certainly prove that, regardless of the size of the town, it pays to departmentize.

4—Basis of Williams' Success

PUTTING each department under a responsible head and making that department justify its existence is the way in which C. U. Williams of the C. U. Williams & Son Co., Overland distributers at Bloomington, Ill., made a success of the automotive business. The company distributes Overland cars, Republic trucks, Alamo farm lighting plants and Lauson and Steel Mule tractors. The accompanying chart shows the organization.

What Williams Does

C. U. Williams, president and general manager, has every department of the business under his direct supervision. However, he pays personal attention to the administrative end of the business. For instance, the matter of factory contracts, advertising, financing, and the correspondence comes directly under his personal charge. He assumes responsibility also for the office administration but delegates for details.

A significant feature of this organization is the entire divorce which exists between the car and truck departments and the farm light and tractor departments. The car department and truck department are under the direct personal supervision of W. W. Williams, secretary and assistant manager. The chart shows the differentiation of departments in the car department and the manner of their co-ordination and control.

The farm light department and the tractor department are entirely separate and distinct from the organization as a whole. These departments in no way have any connection with the other departments of the business. Subject, of course, to the supervision of C. U. Williams, the heads of these departments are supreme in their provinces. Special salesmen, both wholesale and retail, are attached to each of the several departments. For instance, there are nine men in the motor car sales department, four in the truck department, seven in the tractor department and twelve in the farm lighting department. This makes for concentration of effort and better results.

Williams says the most serious difficulty experienced in departmentizing an automotive business is to get competent men to head the departments. With a business as diversified as the Williams business it is impossible that he should have all of the detail loaded on to him. His idea is that this should be delegated as far as possible. The head of an institution of this kind has sufficient to do to carry on the work of general supervision and look after the administrative details.

Problem of Men

Unless a department can justify itself there either is something wrong with the goods which are sold or with the men who control the destinies of the department itself. Inasmuch as all the commodities handled by the company are distinctively automotive, the problem is one of men distinctively. As the Williams company is recognized as one of the really successful automotive concerns in Illinois, it is probable that this problem has been fairly well solved by the ability of C. U. Williams to select the right kind of men.

NAVY GETS HISPANO-SUIZAS

Washington, June 14—The Air Service has transferred to the Navy Department fifty 500-hp. Hispano-Suiza engines and spare parts for replacement. The Navy Department acquired the engines and parts at their actual cost to the War Department, which was $227,000. These engines were purchased by the War Department to equip bombing planes. The Navy is now using this type of engine in certain of its seaplanes and dirigible balloons.

MOTORS SAVED DETROIT TRAFFIC

Detroit, June 14—Detroit's streetcar strike is settled. Cars started operation Thursday night after remaining idle since Sunday morning. Cars and trucks made walking unnecessary, however. They kept the factories and offices running and otherwise fulfilled their duties in such a capable manner that it was possible for anyone in Detroit to get anywhere without trouble or great delay.

Traffic was four times normal. In spite of this heavy traffic which congested the streets with trucks and cars, the period of the strike was remarkable for its lack of accidents. There has been a big "safety first" educational campaign on this month in Detroit and the preachment of caution has been carried into every corner of the city.

After the first day of the strike, hundreds of buses started business and with the aid of the traffic department lines on all the principal streets were established. Trucks as well as cars were used in this service. Then the "free ride" sign began to appear on the windshields. Hundreds of business men carried scores of passengers daily. Within 24 hr. it was as easy to hail a "free" car as to stop a taxi and pay a toll.

There was a pronounced increase in car sales during the strike. While many orders for new cars were placed, the heaviest turnover was in used cars. There are no new cars on sale in Detroit for immediate delivery so purchasers, anticipating a long strike, turned to the market in which they could secure machines at once.

A canvass of the leading industries showed all in full operation with approximately 90 per cent of their working force present. Employment men said the majority of the missing 10 per cent were men who used the strike as an excuse for taking a vacation.

British Make Non-Stop Atlantic Flight

Vickers-Vimy Plane Crosses Ocean in 16 Hours and Wins $50,000 Prize

CHICAGO, June 16—While the honor of being first to fly across the Atlantic belongs to an American plane—the NC-4—to the British go the palm for the first non-stop flight across the ocean, and with it the $50,000 prize offered by the London Daily Mail.

Lost in a bowl of fog, cut off from wireless communication with land, the feat of Capt. John Alcock and Lieut. Arthur W. Brown is stupendous and marks a giant stride in the science of aviation. The flight of some 1960 miles was made in the record time of 16 hr. 12 min., which is a new mark of 120 m.p.h. for a flight of such length. The plane, a Vickers-Vimy bombing model fitted with two 350-hp. Rolls-Royce engines, was piloted by Captain Alcock, a British naval flyer, and navigated by Lieutenant Brown, an American.

Route Almost Direct Line

The plane left the flying field near St. John's, Newfoundland, and flew almost on a direct line of 1960 miles to the west coast of Ireland, landing in a bog near Clifden, Galway, on the Irish coast, yesterday morning at 3:25 Chicago time. This route was the same as that attempted by Hawker and Grieve, whose Sopwith plane fell when they were 1100 miles at sea.

The Vickers-Vimy plane did not use all its fuel supply. It carried more than the Sopwith, 865 gal. to 650 gal. on the Hawker plane. Both the Vickers-Vimy and the Sopwith made 120 m. p. h., though of course the former set the record for distance covered at that speed. The Vickers-Vimy plane was a good deal larger than the Sopwith, carrying two engines to the Sopwith's one. The Rolls-Royce in the Sopwith, however, was rated at 50 more horsepower than those in the Vimy. The spread of wings for the two compare as follows: Vickers-Vimy, 67 ft.; Sopwith, 46 ft. 6 in.

The NC-4, the American naval plane, first to cross the ocean, carried four Liberty engines of 400 hp. each, had a wing spread of 120 ft. and averaged 100 m. p. h. No attempt was made in that trip at speed, it will be remembered, though now there remains only to further transatlantic contenders the setting of speed records for nonstop flights across the ocean.

With the honor of being first to cross and that of being the first to make a nonstop flight won, the latter taking the $50,000 prize at the same time, other airmen state they are not to delay their attempts but expect the air ministry or private individuals to put up stakes for speedy voyages.

DEALERS PUSH TRUCK ROUTES

Buffalo, N. Y., June 14—A $1,000,000 corporation is being formed to establish motor truck service between Buffalo and Utica, N. Y. A committee including H. M. Damon of the Sentinel Motor Corp.; Henry May, Jr., of the Pierce-Arrow; H. E. Seanor of the White Co.; J. N. Firman of the Packard Company; and C. L. White, who is organizing a truck department of the Automobile Club of Buffalo, was named to make plans for a general meeting of truck dealers in western New York. At this meeting plans for establishment of truck freight routes, including the one mentioned, will be completed.

Plans have been made by Buffalo truck dealers for a highway transport day in September. Fleets of trucks will parade in Buffalo before showing their practicability by delivering loads to New York and Pennsylvania cities.

DEALER TO SHOW USED CARS

St. Louis, Mo., June 14—Something new in the way of a motor car show will be given here next week, when the Coliseum will be used by the Newell Motor Car Co., Paige and Stearns distributer, for an exhibition of used cars. Only used cars will be shown. Between twenty-five and thirty cars that have been taken as part payment for new ones will be displayed. The show will run one week and after an intermission of a week, due to the Coliseum having been rented for another purpose, will be resumed for a week.

PENCE DEALERS PLAN BIG TRIP

Minneapolis, Minn., June 14—July 4 is to be a big day for Cleveland, for 425 dealers in Buick cars and G. M. C. trucks will spend the day there. Cleveland is one of several stops which all northwestern representatives of the Pence Automobile Co. will make on their annual tour to the Buick and G. M. C. factories.

To make the tour doubly enjoyable the dealers will be taken most of the way from Minneapolis to Buffalo and back to Chicago by lake steamer. W. R. Stephens, sales manager of the Pence company, has chartered the North American for the week.

The Vickers-Vimy in which Alcock and Brown made the non-stop hop across the Atlantic. The plane was equipped with two Rolls-Royce engines of 350 hp. each

A special train will take the dealers the morning of June 28 from Minneapolis to Duluth to board the boat. The following day will be spent on Lake Superior. Bay City will be reached Monday morning, and a train will land the excursionists in Flint at 1 p. m. Bay City will be reached again Tuesday night, and a day run will be made to Buffalo and Niagara Falls. Cleveland, Detroit, Mackinac Islands and Chicago are remaining boat stops. A train will leave Chicago at 11:15 p. m., July 7, for Minneapolis, which will be reached by the special at noon on Saturday.

NO CARS TO SELL; TOUR

Milwaukee, Wis., June 16—Salesrooms that are absolutely bare of cars have become a common sight in Milwaukee during the last week or two, due to the demand for cars and the insufficiency of the supply. For a majority of dealers the business of selling cars today is a waiting game—waiting for deliveries from the factories. Not a few local dealers are sold up on all the cars they can reasonably expect to obtain during July.

Members of the Milwaukee Automobile Dealers, Inc., are looking forward with much anticipation to the three-day combination business tour and sociability run to be conducted June 24, 25 and 26 under association auspices. Lake Geneva, 50 miles southwest of Milwaukee, has been chosen as the objective. The affair has been designated as a sociability romp, and the 100 or more dealers, sales managers and department heads who will participate plan to effectually disconnect themselves from the cares and worries of business for the three days.

To-morrow will be Packard Day in Milwaukee. Between 1000 and 1200 members of the Packard merchandising organization will stop here for a day on their cruise of the Great Lakes as part of the annual sales convention, usually held at the factory in Detroit. An interesting feature, for Milwaukee people as well as the city's guests, will be the visit of Ralph de Palma, who is rushing from New York to drive the Packard which holds all world's speed records at the head of the big parade through the city by the Packard men upon their arrival here.

MUSIC TO SELL CARS?

San Antonio, Tex., June 14—The Walthall Co. has been formed with headquarters in this city to conduct a state business in the combined sales of cars and musical instruments. The present capital stock is $75,000, but this is to be increased to $100,000. The new corporation will succeed the Walthall Motor Car Co., distributer for the Hupmobile, and the South Texas Music Co. Branch houses are to be established. A three-story building has been leased here. On the top floor will be a complete machine shop; on the second floor, a piano shop and the repair and paint department, while the ground floor will be used for the sale of rebuilt cars.

City's Commercial Radius Good Roads

Message Brought Home by St. Louis Truck Tour to Merchants and Dealers

ST. LOUIS, MO., June 14— That a city's commercial radius is limited only by its good roads and a truck dealer's sales territory only by his inclination to "go get 'em" is the conclusion of Harry G. Moock, N. A. D. A. business manager, after accompanying the truck expedition on its 450-mile trip. Fifty trucks left here Monday, making St. Charles, Louisiana and Hannibal, Mo., Quincy, Beardstown, Whitehall, Jerseyville and Alton, Ill. Each carried a sign "Reduce hauling costs. Ship by truck."

The expedition was under the auspices of the St. Louis Automobile Manufacturers' and Dealers' Association, and all kinds of bodies, colors, trailers and so on were demonstrated with the trucks. The object of the trip was to bring home to the farmers the possibilities of trucks and also to convince St. Louis merchants of the desirability of broadening their trade territory by use of trucks.

Varied Loads Carried

As an example of the varied loads, two Traffic trucks carried baled hay. A Republic carried a load of Firestone tires for delivery to a Hannibal dealer, the noon stop the second day. Another Republic carried empty boxes and metal kegs in which explosives from the Hercules Powder Co. are shipped. A G. M. C. truck carried a powerful storage battery with a Delco light plant to charge it and on each stake, an electric light which was lighted at night. In addition this truck carried a giant spotlight on each side in front. The Weiling Motor Co., equipped two All-American trucks with its three-style body. The Aldrich-Stephens Motor Co. had a fog horn worked by bellows mounted on a 1909 Locomobile chassis converted into a truck by a Hudford attachment. Truck body builders co-operated with truck distributers in outfitting the trucks for the expedition.

Efficiency of 100 per cent was attained in the expedition. All the trucks that entered the tour returned without a single mishap. The trip was made on an average of 15 m.p.h., and the expedition always was on time. None of the trucks required even an adjustment.

The attention the trucks attracted all over the route and the interest shown in every feature of the trip made certain the success of the expedition. The value of trucks as a means of transportation made a deep impression on rural Missouri and Illinois. The publicity given to the tour in the newspapers, which told of the way the trucks stood up under the hard strain, also served to bring forcibly to the attention of St. Louisans themselves the value of truck transportation in broadening their territory.

Those in charge of the trip were more than delighted with the results obtained. It has created an interest in motor transportation and has done more in the education of the farmer and those in the smaller towns in the value of such transportation than could possibly have otherwise been realized. As a sales proposition the tour was a success in that many prospects were lined up, and it is believed that direct results will result soon that will in themselves make the trip more than worth while.

The roads over which the tour was made were dry. There were no hard roads. In some places there were deep ruts. None of the roads was in good condition, but the trucks went over them in good shape, further demonstrating their value.

Big Crowds All Along

Big crowds greeted the expedition all along the route. Farmers and their families lined the roads to see the cars pass. At the night stops almost the entire population turned out. Wherever stops were made short talks on good roads and motor truck transportation were made. The speakers were Harry G. Moock, who suggested the expedition; Charles E. Lightfoot, General Motors, chairman of the Commercial car division of the St. Louis Automobile Manufacturers' & Dealers' Association; L. H. Amrine of the Scudder Motor Truck Co., chairman of the tour committee; T. C. Brandle, vice-president Traffic Motor Truck Co., and Capt. Robert E. Lee, commander of the expedition. Preston W. Duffy of the Chevrolet Co. was truckmaster, and W. L. Patterson of the St. Louis Motor Service Co. drove the pilot car.

The evening addresses were delivered from a G. M. C. Truck electrically lighted by a Delco lighting plant that it carried. A motion picture machine was carried on a Maxwell truck, the power being fed from the city current.

But one accident marred the trip. Two airplanes had been entered by the Service Co., Wabash, Ind. The planes were to make the trip as scout heralds. One plane was damaged the first day in making a descent and forced to put back. Next day the relief aviator, Oscar Brick, went into a tail spin when attempting a landing at Hannibal, Mo., and he was burned to death.

Attention to the opportunity for a truck demonstration at Timewell, Mo., was given by Mr. Moock, who noticed a two-horse wagon carrying a 9-bbl. galvanized iron tank full of water stuck in the mud at the curb, the rear axle resting on the ground. Men were prying up the rear wheels with timbers to insert planks under the wheels. The horses were unspanned, a tow chain fastened to the tongue of the wagon and to the rear of a Dorris truck, which whisked the wagon out in a hurry.

EDITORIAL

Tractor Demonstration Hints

THAT the farmer watching a tractor demonstration with keen eyes takes home a lot of valuable information goes without saying, but we are not so sure the exhibiters of such a demonstration always take home some of the silent and, in many cases, well founded criticism on the part of the men to whom ultimately such machines must be sold.

TAKE the recent demonstration at Denver. Here was soil which since the beginning of time had never been scratched by any sort of agricultural implement, save perhaps the crude apparatus of the American Indian. For centuries the ground had been baked by the sun and naturally it was very hard. It was a case of trying the mettle of tractor and plow. It would have been no disgrace for a three-plow tractor to pull but two, and do the job well. The farmers appreciated the character of the soil and did not have to be told that it was hard to work.

YET some of the machines were out to do circus performance, and in some places the plowing appeared to take on the form of a speed contest more than a contest of consistency and endurance. This especially seemed foolhardy where distances are so vast as in the prairies of Colorado, for big distances call for big machines and slower speeds. To run a smaller machine at high speed through this rock-like soil is simply a case of seeing how soon such a machine can be worn out. The observing farmers are not slow to catch this point, and one frequently overheard remarks about this at the Denver show.

ANOTHER point for the exhibiter. Do all your adjusting, so far as possible, the day before. Where you have three or four and sometimes more men following your outfit over the field, the farmer becomes skeptical and is led to believe that he too will need a corps of mechanics to follow his tractor and plow, if he buys one. If a machine is designed to be operated by one man, then by all means let one man operate the machine and plow just as the farmer would operate it himself. On the very large machines, of course, more men are permissible.

A FAR better plan for these helpers would be to stand on the side lines and convey the idea to the public that their machine was all right and needed no looking after outside that given by the operator. Let your onlookers follow the tractor and plow, while your men from the factory or agency stand by. The day before a demonstration generally is set aside for adjustments and should suffice.

Following-Up Car Sales

THE average dealer does not follow up his sales closely enough. Each sale a dealer makes should be an addition to his service clientele. He should keep his customers alive at all times to the fact that he maintains an adequate service station for their benefit. Through following up his sales he can make his service department a profitable end of the motor car business. This can be accomplished best by a card follow-up system suggesting hints on the care of the owner's car.

THUS, a new car owner should be advised by some form of postal card that he should change the lubricating oil in his crankcase at least after the first 500 miles of running. He also should be told that he should not run his car in excess of say 20 m. p. h. for the first 200 miles. The reason for this is obvious, as he must care for the new piece of machinery which he has purchased and break it in with considerable care. Hints of these kind can be made to apply to repair work, to coach work and to new accessories.

AS the number of motor cars in service increases each year the maintenance end of the motor car industry becomes more important. A service department that is weak is a poor sales argument. The business man who buys his car for business reasons wants to know if you are capable of giving good service. If you are not, you are likely to lose the sale. And the concern that has the best service is likely to make the sale, whether or not the customer likes your competitor's car as well as your own. A service department must live off of the cars sold. Do not forget the new car buyer. Keep up your interest in him and it will keep up his interest in you.

Closer Bonds of Communication

THE United States and the rest of the world are closer together this week than they were last. They are closer together because it has been demonstrated that air flights across the Atlantic are possible, in 16 hr. or less. The feat of the British aviators in making a non-stop flight from Newfoundland to Ireland opens up a new era in aviation and reveals the wonders which await us. That transatlantic flights were feasible had been demonstrated already by the flight of the American aviators. This last shows a straightaway flight is not only possible but also is a future commercial factor.

TRULY, this is another Columbus day of discovery. The names of Alcock and Brown and of Read and his crew will rank in history with that of Columbus in all probability as leaders in a new era of communication between the continents, of closer communication. Both successful, the British airplane and the American seaplane made their flights under different ideas. That of the NC-4 was undertaken to establish the practicability of crossing the ocean under conditions of comparative safety. The British plane was to establish the practicability of a non-stop flight. Both succeeded, and therein lies the beginning of the new era.

Franklin Sets New Mark for Yosemite Run

Proves Biggest Winner—Briscoe and Stephens First in Their Price Classes

LOS ANGELES, Cal., June 14—The demand for motor cars in Southern California has been so great that when the third annual Los Angeles-Camp Curry, Yosemite Valley, gasoline economy contest was held May 30-31 only eleven cars competed. At one time twenty entries were nominated, but when the starting date arrived it had been found necessary to withdraw some of these to deliver the cars to buyers. One distributer borrowed a car from a subdealer to participate, as his stock had been exhausted.

Used Least Fuel

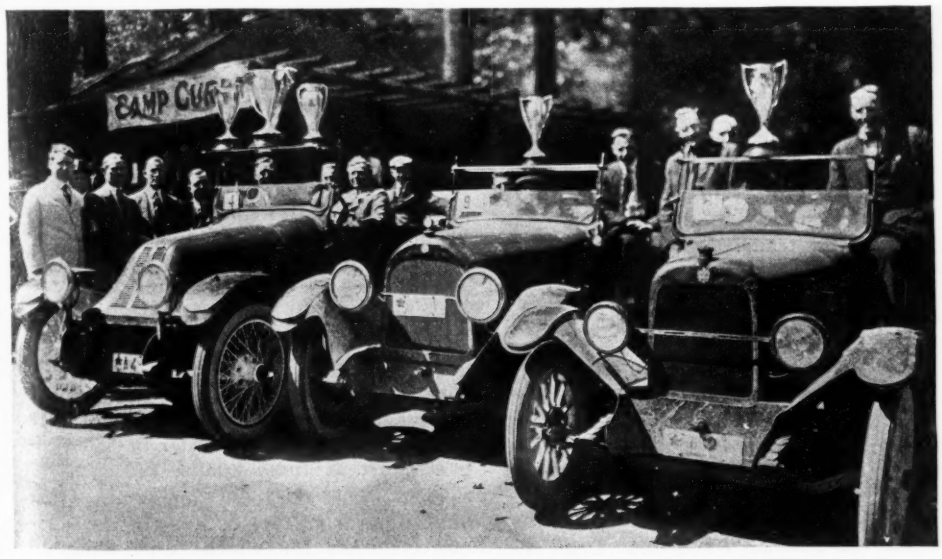
A Franklin touring car entered by Ralph Hamlin and driven by Stanley S. Turner, Pasadena, was the biggest winner. Not only did the Franklin take first honors in its class but the sweepstakes and a special award for using the least gasoline, oil and water. A Briscoe touring car won in the class of cars selling at the factory for less than $1,000, and a Stephens touring car took the honors for cars selling for less than $2,000. The other contestants were a Marmon limousine, Stearns touring, Peerless touring and Templar touring in the more than $2,000 class; a Mitchell and Lexington touring in the medium-price class; and an Overland and Dort touring in the low-price division.

In winning, the Franklin established new records for the run. The 375.4 miles were covered on 13 gal. of gasoline and 2 qt. of oil. The basis of the contest was ton-mileage, and the Franklin averaged 49.98 ton miles a gallon. This was the best in any of the three runs. The Stephens used 17.5 gal. of gasoline and 1 qt. of oil. To increase this car's weight—weight being a factor in ton mileage—several pigs of iron were carried, but in the end they proved a handicap as the additional weight apparently affected the cooling properties and 3 gal. of water were consumed as against the Franklin's none. The Briscoe used 13 gal. of gasoline also and 2 qt. of oil and 2¼ gal. of water.

To appreciate what kind of a test these competing cars underwent it is necessary to understand somewhat the conditions encountered. The cars traveled over pavements for the first 45 miles. Then there were 15 miles through a canyon that was almost all up-grade. This was followed by 60 miles of zigzagging along a badly rutted trail that skirts the lower end of the Mojave desert on a tableland. Here a terrific headwind was encountered, and drivers estimated they had to use twice as much gasoline as would have been consumed to make the same speed without the wind resistance. Having crossed the Tehachepi ridge, there were no more grades to Fresno, 252 miles from Los Angeles, where the first day's run ended.

The second day the cars traveled 30 miles over pavement and then struck out across country for the valley. From Madera, at an elevation of 278 ft., they climbed to approximately 7000 ft. at the summit at Chinquapin 12 miles from the rim of the Yosemite. The second night preceding the day of the run there had been a cloudburst in the Chowchilla mountains, and the contesting cars were the first through except the motor stages. The soft road and axles dragging in the ruts made the driving not only exceedingly difficult but at times dangerous as well. There were fully 40 miles of second gear work.

Cars have to be in splendid condition to get through at all under the time limitations, and drivers must pick their way with the accuracy of a mountain sheep to enable their cars to economize on gasoline. Of course, coasting was permissible at any time, but too great a coasting speed was dangerous. None of the cars came to grief along the way, but magneto trouble in the Tejon pass so delayed the Marmon limousine that the night control was not made within the limit. The car continued in the run, however, without competing the second day. While in the Yosemite the entire party was the guests of Camp Curry. Four of the cups for the winners were presented by Foster Curry and the fourth by the Automobile Club of Southern California. This was the second time a Franklin car has won, the first time being in 1916, when a brougham was the victor.



The three winners in the Yosemite Valley gasoline economy run lined up with their trophies. The Franklin not only took first honors in its class but won a special award

CLEVELAND-DETROIT BY AIR

DETROIT, June 14—The Universal Aviation Co. has been incorporated here for passenger service between Detroit and Cleveland to afford the public opportunity for pleasure trips in Michigan, Ohio and Indiana. Regular inter-city service is planned. Amateur aviators will be given instructions by the company and the regular hanger service provided.

The officers of the new enterprise are: President, Henry M. Leland, president of the Lincoln Motors Co.; first vice-president, E. E. Allyne, president of the Aluminum Castings Co., Cleveland; second vice-president, David Poll, director of the Hayes Mfg. Co.; secretary and treasurer, Harry D. McCullough, secretary and treasurer of the King Motor Car Co.; general manager, J. T. Patterson, long associated with aviation work.

Land flying activities will begin immediately at Morrow field, with four airplaines of the Curtiss type. Six more machines have been ordered. The company has two flying boats. The pilots, all of whom have been in government service, are S. H. Dicran, Edward Wismiller, C. R. Sinclair and C. R. Griffin.

BRUENAUER RESIGNS

Chicago, June 14—Otto Bruenauer, formerly director of sales and engineering of the U. S. Ball Bearing Mfg. Co., has resigned. Otto Bruenauer and Howard L. Spohn became identified with the company in January, 1917, and with Walter H. Strom had charge of the plant. As a result of the reorganization and changes in policy consequent upon the death of Walter H. Strom last January, Mr. Spohn resigned as commercial manager in May. Mr. Bruenauer's resignation following. Mr. Spohn immediately returned to the Class Journal Co. Mr. Bruenauer's future plans have not been announced.

N. A. C. C. Truck Standards Revised

Speed Rating and Body Weight Tables in the 1912 Original Are Changed

NEW YORK, June 14—New truck standards have been recommended by the Truck Standards Committee of the N. A. C. C. to replace the original standards adopted in 1912. Changes include the elimination of the demonstration charge table and a revision of the speed rating table and the table of body weight allowances.

The body weight allowance table has been brought out by the fact that the body is the factor, determining the size and type of chassis which must be quoted on. This will be helpful to the retail salesman as it will enable him to specify the proper chassis for a certain hauling condition. The body and class of hauling should always be considered before a decision is made regarding the chassis. The recommended changes in the 1912 standards follow:

1—Standard Demonstration Charges. We recommend that this table be eliminated.

2—Standard Speed Rating. We recommend that the present table be eliminated and that the following table be adopted:

Gross Weight	M.P.H.
Pneumatic tires, up to	
28,000 lb.	25
Solid tires, up to	
4,000 lb.	25
8,000 lb.	20
12,000 lb.	18
16,000 lb.	16
20,000 lb.	15
24,000 lb.	15
26,000 lb.	15
28,000 lb.	15

These speed ratings should be recognized by the manufacturer as the maximum and not exceeded under any conditions. The manufacturer should stamp on the truck caution plate the actual maximum speed with load for which the truck is built and beyond which the truck is not guaranteed.

Standard Body Weight

3—Standard Body Weight Allowances for Trucks. We recommend that the present table be eliminated and that the following table be adopted:

Load Tons	Body Weight Allowance
1 ton	1200 lb.
1½ ton	1200 lb.
2 ton	1500 lb.
2½ ton	1500 lb.
3 ton	2000 lb.
3½ ton	2000 lb.
4 ton	2000 lb.
5 ton and over	2500 lb.

We recommend that no change be made in the note which now accompanies the table on standard body weight allowances.

4—Standard Frame, Widths and Lengths for Trucks. This table has been referred to the Truck Standards Committee of the Society of Automotive Engineers for revision.

5—Standard Caution Plate for Motor Trucks. Committee recommends that the present form of plate should be retained and that the six foot notes should be retained with the exception of the note headed "Speed Rating" which should be revised to read as follows: "The figures given in the table headed 'Standard Speed Ratings for Motor Trucks' should be recognized by the manufacturer as the maximum and not exceeded under any condition. Manufacturer should stamp on the truck caution plate the actual maximum speed with load for which the truck was built and beyond which the truck is not guaranteed."

As stated truck manufacturers should be responsible for six of the weights which are called for on this plate, as follows: Freight load capacity, standard; body weight allowance, standard; weight of chassis, standard and actual; total weight, chassis body and load, standard and actual.

The truck manufacturer, his distributer, dealer or agent, should be made responsible to see that the body is weighed and that the plate is stamped: Freight load capacity, actual; body weight allowance, actual.

FORDSON PRICE DROPPED $135

Detroit, June 17—Special Telegram—Henry Ford & Son are wiring all distributors of a reduction of $135 in the price of the Fordson tractor. The new tractor price, which is effective at once, is $750. The old price was $885. The price to the distributor is $600 who turns it over to the dealer at $635. The Fordson tractor plant is now getting back into heavy production. Approximately 100 machines are being completed daily. A carrier system similar to the one in the Ford Motor Co. plant at Highland Park is being installed and production is to be doubled within 60 days.

FORT SNELLING TO COME BACK

Minneapolis, Minn., June 14—Racing is to be resumed at Fort Snelling in 1920. The big plant, which was being scrapped by its owner, Guy A. Thomas of Minneapolis, is to be revamped and stands provided for 50,000 persons. The new owner is the Snelling Field, Inc., formed by Indianapolis men largely and incorporated in Indiana. The field originally was built by Indianapolis-Wheeler capital.

MAY REVIVE GLIDDEN TOURS

Atlantic City, N. J., June 14—The possibility of a transcontinental reliability run from New York to San Francisco is seen in the action of the American Automobile Association at its annual session here this week. The question was referred to the contest board, and it is considered possible the event, which is for the Glidden team trophy, the A. A. A. $2,000 cup for the touring car class, will be scheduled for the late summer of 1920.

The American Automobile Association, in annual session here this week, indorsed the Federal Air road act now pending in Congress with the suggestion that it be amended to restrict the aid given to roads that are part of a well-defined state system. It also was suggested the Secretary of Agriculture be given authority to increase the aid given to 75 per cent in certain cases.

David Jameson was re-elected president. The first woman to hold office in the association was elected a vice-president. She is Mrs. Robert Lee Morrell, an attorney of New York. The other officers are: Vice-presidents, Ralph W. Smith, Colorado; P. J. Walker, California; H. J. Clark, Minnesota; Clifford Ireland, Illinois; Dr. John H. Quayle, Ohio, and Dr. R. R. Elmore, Kentucky. H. A. Bonnell of New Jersey will begin his twelfth year as treasurer, and John N. Brooks of Connecticut is again secretary. A. G. Batchelder holds over as executive chairman.

FISHER EARNS $6.44 A SHARE

Detroit, June 14—The Fisher Body Corp. and it subsiderary, the Fisher Body Corp. of Canada, earned $1,603,289 last year after deducting interest, Federal taxes and appropriation for dividends on the company's outstanding preferred stock. This is equivalent to $6.44 a share on the company's 200,000 shares of common stock of non par value.

Before deducting the Federal tax, but deducting all expenses of the business, the net earnings were $3,534,853.38. Interest deductions were $306,564.08, and the amount set apart for Federal income and war excess profit taxes was $1,625,000.

CANADIAN PLANT FOR WILLS

Detroit, June 14—C. Harold Wills and John R. Lee whose plans for the erection of a motor car plant at Port Huron, Mich., were announced, will build a Canadian branch factory at Sarnia, Ontario, as soon as the Port Huron plant is completed and in production. Sarnia is situated just across the river from Port Huron and the Canadian plant will be built exactly opposite the Port Huron plant with ferry boats connecting the two institutions.

It is too early to give an estimate on the cost of the two plants. The Canadian plant will be located on a 250-acre site already purchased. It will employ approximately 2000 men and will manufacture the car complete for Canadian and British sales.

The Port Huron plant will go up at once. This will be situated on a 3000-acre tract and will employ approximately 15,000 when in full operation.

INTER-STATE SUIT DISMISSED

Chicago, June 14—The suit brought by the Inter-State Motor Co. against the Rutenber Motor Co. for $750,000 in 1916 has been dismissed by order of the Federal court at Indianapolis, Ind.

This case attracted much attention among parts makers because of the various elements for which large amounts were claimed for alleged losses. The complaint alleged the two companies entered into a contract July 30, 1915, for

the delivery of a minimum of 3000 engines in a specified time and that a supplemental agreement signed in November, 1915, provided for an increased delivery of 5000 engines. On the basis of this contract, Inter-State alleged, it made investments approximating $200,000 in other parts and received orders for 5000 cars. The plaintiff asked damages on the ground that Rutenber failed to deliver the number called for in the contract.

G. M. BILLION CAPITAL APPROVED

Wilmington, Del., June 13—The stockholders of the General Motors Corp. at a meeting here to-day approved an act of the directors increasing the capital stock from $370,000,000 to $1,020,000,000. This is divided between $500,000,000 debenture stock, $5,000,000 common and $20,000,000 preferred stock.

FEDERAL INDICTMENT FOR PAN

Washington, June 14—The Federal Trade Commission has brought complaint against the Pan Motor Co., St. Cloud, Minn., and its president, Samuel C. Pandolfo, stating it has reason to believe the concern, which, the commission alleges, had taken in $4,723,811.69 from the sale of stock from its incorporation in January, 1917, to February 28, 1919, and its president have circulated false, misleading and unfair advertisements, statements and the like concerning assets, resources, etc., and have suppressed from the public facts relating to the plan of organization and financial standing.

The company and its president are cited to appear before the commission July 10. The commission alleges that up to September, 1918, $1,156,667.53 had been paid out as commissions to salesmen and agents for the sale of stock and that $553,725.38 had been paid to Samuel C. Pandolfo as commissions and for alleged services and that despite the fact that the Pan Motor Co. represented that it planned to "manufacture" cars on a large scale, some 200 cars merely had been assembled by the company.

INTER-CITY RUN A TIE

New York, June 14—Because the reports of inexperienced observers assigned to the cars were so vague as to be practically valueless, the inter-city reliability contest between the New York Athletic Club and the Chicago Athletic Association, run June 12-13 over a 350-mile course, was declared a tie.

After spending several hours attempting to check up the observers' records, the committee in charge decided to announce a draw, the team leaders consenting, and plans were made for a run next year in Chicago.

ACME PRICES INCREASE

Cadillac, Mich., June 14—The Acme Motor Truck Co. will increase the price of its 3½- and 5-ton models $100 each July 1. The raise is explained by the improvements made, a pressed steel heat-treated frame instead of a channel section, inclosed flywheel, etc.

Army Tractors and Trucks for Roads

Will Be Turned Over by War Department for Distribution to States

WASHINGTON, June 16—Special telegram—Of the 28,000 motor vehicles to be turned over to the Bureau of Public Roads, 22,000 will be trucks. Already 8,000 trucks have been delivered to the Bureau and, in turn, to the several states which will use them for road construction. Also, 600 army tractors, of which 317 were 20-ton and 53 were 15-ton Holt caterpillar type, have been turned over by the War Department and distributed to the different states of the bureau. Several hundred more tractors will be turned over.

Figures showing distribution of the trucks and tractors to the different states are withheld by the Bureau of Public Roads, and any figures which have been published showing the numbers of trucks apportioned to different states are said to be unofficial. The bureau is not making public the figures, because it fears any publication will cause many states that have not received tractors or trucks to protest to such an etxent that congressional action may interfere and harm the road work.

Under the plan the bureau declares, every state will receive all the tractors and trucks to which it is entitled in accordance with its proportionate subscription for Federal road aid for this year. Furthermore, the bureau declines to make public the figures at present because it has not yet received the complete inventories from the War Department showing the character of the equipment which will be turned over and is, therefore, unable to definitely complete the apportionments for all the trucks and tractors it will receive from the military authorities.

Army Transfers Motors

Other Departments Get Entire Surplus of Cars and Trucks Held in U. S.

To Sell Limited Number of Used Vehicles

WASHINGTON, June 13—The Director of ales of the War Department has approved the transfer of the entire present surplus of serviceable cars, trucks and other motor vehicles held by the Army in the United States to other Government departments. This disposes of 39,100 vehicles, including 3,600 motorcycles, 5,500 cars, and 30,000 trucks. The Postoffice Department will receive 10,064 of these vehicles, the Public Health Service 1,396, and the Bureau of Public Roads and Department of Agriculture, 27,983.

This transfer is in accordance with congressional policies outlined in appropriation acts passed in 1918 and 1919, authorizing the transfer of this surplus stock by the Secretary of War to the Postoffice Department, Department of Agriculture and Treasury Department. Because of either special design or unserviceable condition a very limited number of cars and trucks will be sold at public auction at the various camps and storage yards at which they have been collected after the sales have been duly advertised through the press.

Erroneous reports to the effect that the War Department would offer to the public a large stock of motor equipment, including new cars, has been widely circulated. This is denied by the War Department, and the transfer just announced effectively disposes of all these rumors.

OVERLAND HAS RE-OPENED

Toledo, June 14—Willys-Overland reopened Friday with fifty departments in operation, under the order and protection of the United States district court. There was no disturbance. Saturday, thirteen more departments opened, and the entire plant was in operation Monday for the first time since June 3, when rioting caused the company to close the factory. The strike has been in progress nearly two months. Only the number of pickets permitted by the court—fifty to each shift—were on duty.

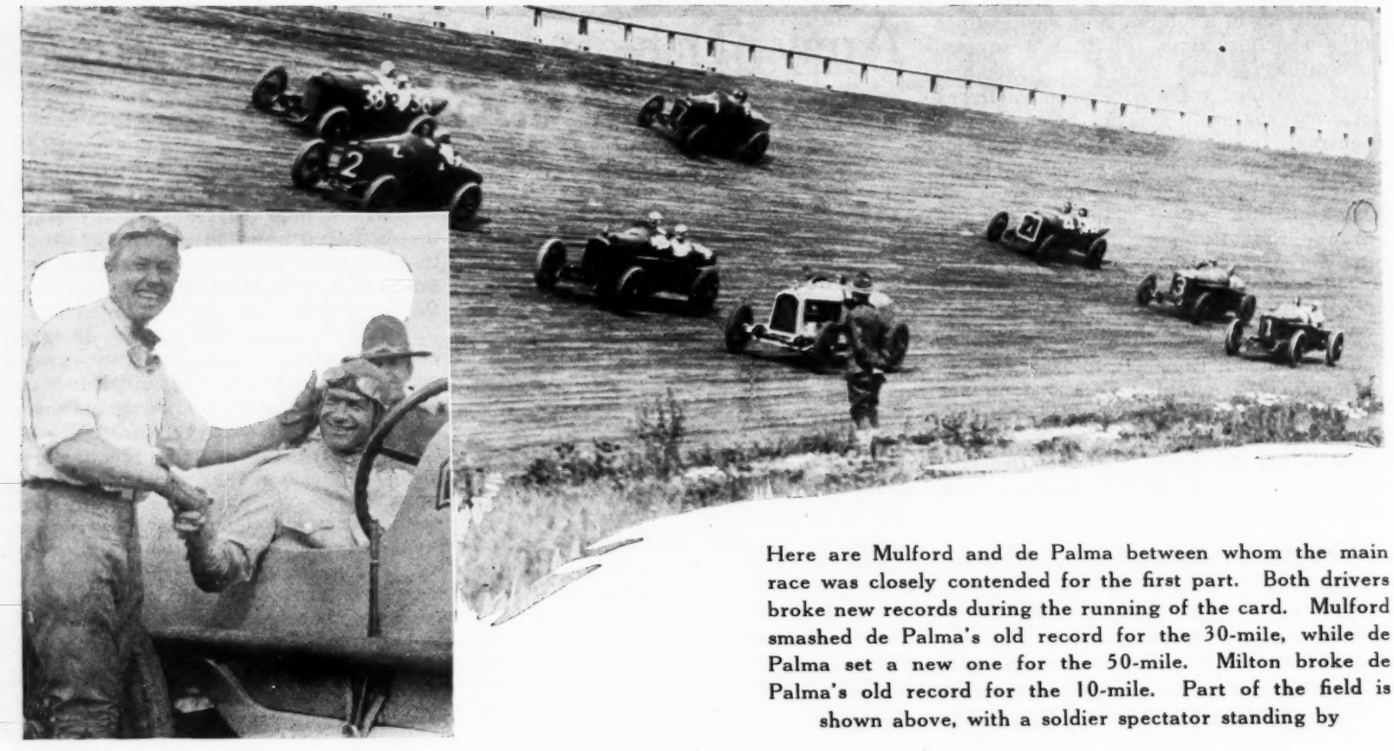
Overland guards at each gate handed each worker a copy of the Federal court injunction as he entered so that each might understand the conditions under which he returned to work and that he was promised the protection of the Government.

Letters signed by Vice-President Clarence A. Earl were mailed to all employees who are still out, inviting them to return to work. The letters explain the recent Federal court action and state the plant and employees are under Government protection. The letter also endorses the suggestion of Federal Judge Killits that a secret ballot be conducted, giving each man and woman now and formerly connected with the plant an opportunity to cast a personal vote to show where each stands in the present disagreement.

Officials of the Auto-Lite plant, a subsidiary of the Willys-Overland, said the number of men returning to work Friday exceeded those reporting on any previous morning during the past two days, and say that all departments are now in full production. This plant has been running since last Tuesday.

ELGIN COSTS $90 MORE

Chicago, June 16—The Elgin Motor Car Corp. has increased its prices $90 on both models, as follows: Victor scout, $1,585; touring, $1,485.



Here are Mulford and de Palma between whom the main race was closely contended for the first part. Both drivers broke new records during the running of the card. Mulford smashed de Palma's old record for the 30-mile, while de Palma set a new one for the 50-mile. Milton broke de Palma's old record for the 10-mile. Part of the field is shown above, with a soldier spectator standing by

Three Records Fall at Sheepshead Bay

De Palma, Mulford and Milton Set New Speed Marks For 50, 30 and 10 Miles Respectively

NEW YORK, June 14—Special to MOTOR AGE—Three speed records fell today in the International sweepstakes at Sheepshead Bay. The main event, for 50 miles, was won by Ralph de Palma in 26:23.4, or at the rate of 113.8 m. p. h., smashing the mark of 26:57.30 set by Louis Chevrolet Sept. 22, 1917. The other two records were broken in the shorter races which preceded the 50-mile. Ralph Mulford won the 30-mile in 16:01.20, beating the record set by de Palma last August. Tommy Milton won the 10-mile in 5:20.20, which was 3 3-5 sec. better than the time of de Palma Aug. 17, 1918.

The original plan called for a 20-mile non-stock race for local cars and drivers not entered in any other event, but this had to be called off on account of the small number of entries. In addition to the regular card of 10, 30 and 50 miles a special 10-mile event was staged. This also was taken by Ralph Mulford, in 5:24.20.

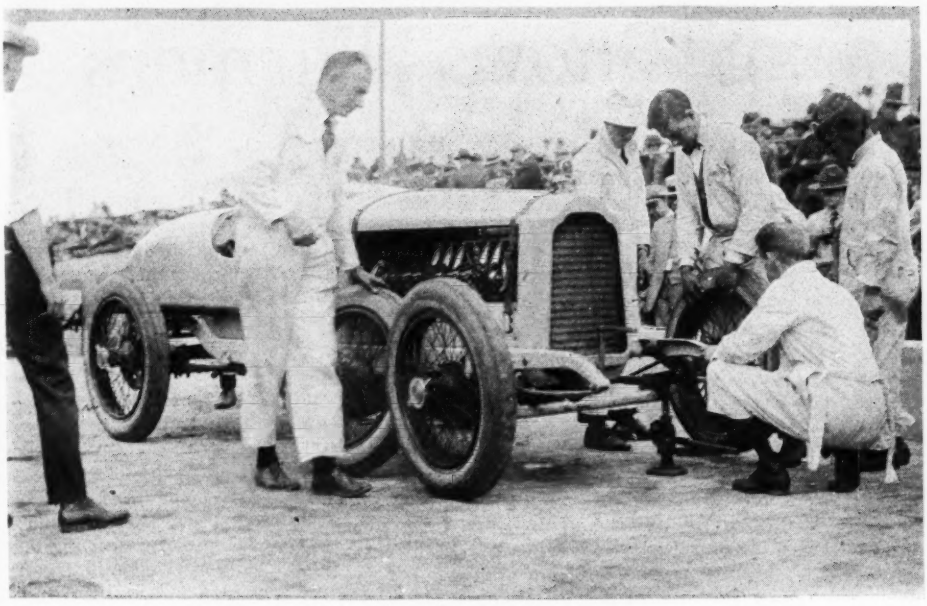
No Accidents

In spite of the pace set by the drivers, not an accident other than a flat tire or two happened. It is estimated that 50,000 were present. The grandstand, with its 45,000 seats, was filled practically to capacity, and hundreds of cars were parked in the infield. Fred Wagner was in his accustomed place as starter, and the races ran off without a hitch.

The main event was the last on the program, which had been arranged under the auspices of the Eastern States Motor Racing Association for a purse of $35,000. The crowd went wild when de Palma, easily the favorite, covered the last of the twenty-five laps ahead of his nearest competitor. The race was his after the sixth lap, when he pulled ahead of the field, his nearest competitor being Mulford, who had won two of the previous races. Mulford stuck close to de Palma up to the twenty-first lap, when he had a blowout and quit the race. Joseph Boyer, Jr., driving a Frontenac, finished second, and Dave Lewis, in a Meteor, was third. De Palma was a lap ahead of Mulford when the latter's tire blew out, but in the lead Mulford was ahead with de Palma close on his heels.

For six laps de Palma and Mulford were so tied it was impossible to tell which was leading until the cars passed right in front of the grandstand. Mulford managed to keep a shade in the lead until he finally was passed by de Palma on the curve going into the back stretch of the seventh lap. De Palma had put

The pitmen had a fairly easy day, as there were no accidents other than a flat tire or two



Changing a tire on de Palma's Packard at the pits

on a terrific burst of speed at this point, but this did not get him a safe margin, as Mulford was right behind for the next three laps. In the eleventh lap de Palma managed to increase his lead to about 50 ft. After this Mulford steadily lost ground, dropping to fourth place in the thirteenth and finally stopping altogether on the back stretch in the seventeenth.

In the meantime a duel for second place was being waged by Boyer and Lewis. Boyer maintained second place from the seventeenth to the twenty-fourth lap but was nosed out on the homestretch by Lewis.

With Mulford out and a fairly safe lead his, de Palma took things easier, but nevertheless came home with a new record. Ira Vail went out in the third lap of this event, while Resta gave up after the first. Ray Howard and his Puegeot which won the Indianapolis race May 31 did not come up to the starting line at the signal, and it was announced that he was having some mechanical trouble which made it impossible for him to start. Neither of the other two Frontenancs piloted by Louis Chevrolet and Reynolds showed up. Altogether nine started: Resta, Mulford, Thomas, de Palma, Milton, Hickey, Vail, Lewis and Boyer.

Weather conditions were splendid, which put the racers at their best. The crowd was enthusiastic, and with only a dozen contestants, no more than nine starting in any one event, everybody was able to follow the field most of the time. The electrical timing device was reported not to be working properly, but even at that it was not such a great calamity, what with a small field and so on. A few pieces of board would fly up now and then, making one wonder if the track did not need some repairs, but all in all conditions were excellent for the sweepstakes, as will witness the new records and the large attendance.

The First 10-Mile

The first race was five laps, for 10 miles, and Tommy Milton in a Duesenberg took this in the new record time already given. Mulford in a Frontenac was second, Resta, in a Resta special, third, and de Palma, Packard, fourth. Nine cars started, the others being: Thomas, Mercer; Hickey, Stickel; Reynolds, Frontenac; Vail, Hudson, and Howard, Peugeot. The start was a flying one, and Reynolds led the first part of the first lap. De Palma, always at his best in short sprints, led by a safe margin by the end of the lap, but Milton pulled up and took the lead in the second with Mulford second and de Palma third. These positions were maintained until the finish, just before which Resta nosed up to third.

Mulford barely nosed out de Palma in the 30-mile, which started with eight cars and ended with five. Mulford took the lead, however, almost from the start and managed to hold it until the finish, turning the last quarter lap on a flat tire. The entries were Resta, Mulford, Thomas, de Palma, Louis Chevrolet, Lewis and Howard.

Milton did not start, as his car was undergoing repairs to fit it for the 50-mile. Reynolds did not enter either. Chevrolet had trouble with a burned valve at the end of the 6th mile and had to give it up. The race started with a three-cornered fight between Resta, Lewis and de Palma, but when Resta went out at the end of the third lap with spark plug trouble, Mulford had a safe lead. He

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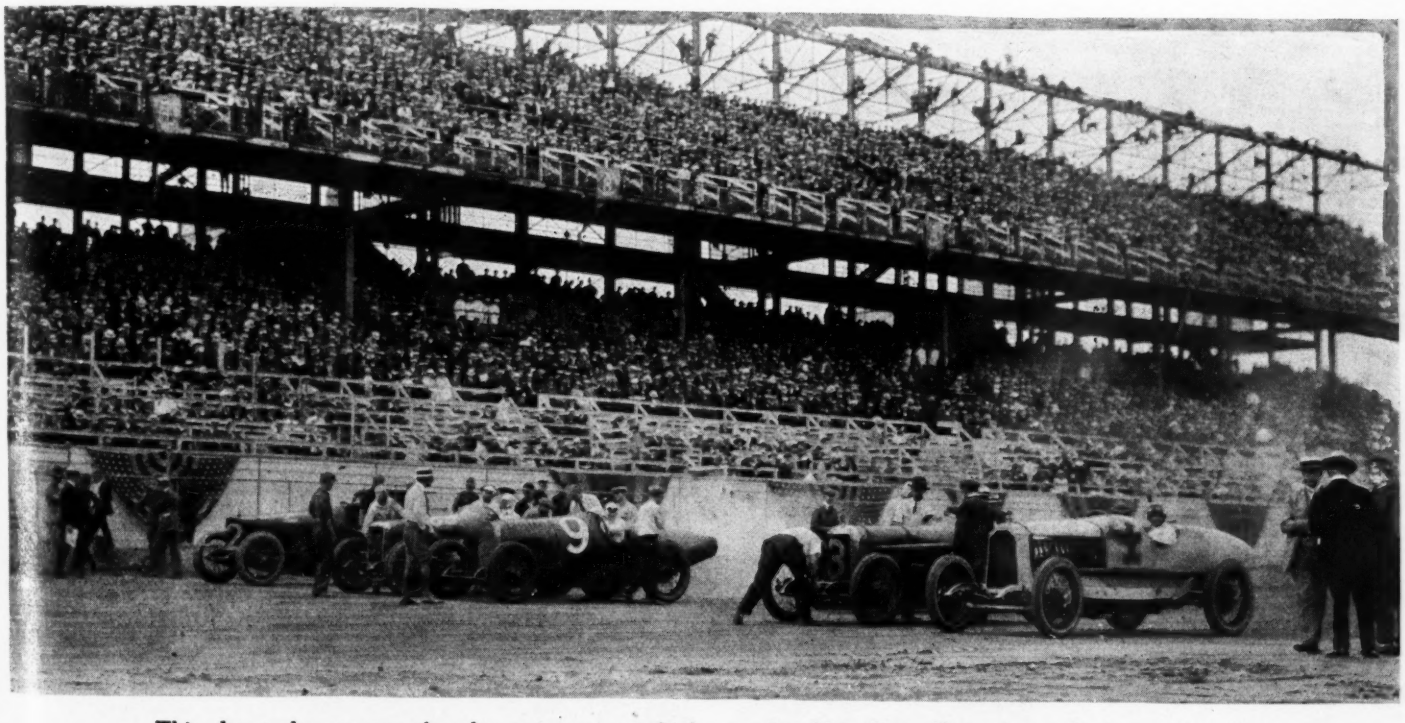

This shows the getaway for the main event, which was for 50 miles. Note the packed grandstands

Denver Plowing "Shows" Farmers

Demonstrates Power Tilling on Big Scale and Paves Way for Many Sales in Prairie Lands

By B. M. Ikert
Motor Age Editorial Staff

DENVER, COL., June 12—Twenty-five thousand tractors for Colorado in the next four years and Denver as the agricultural hub of the country seem to be the two big thoughts at the conclusion of the Mountain States National Tractor Demonstration to-day.

The show has been of great educational value to farmer and tractor maker alike. To the farmer it has shown power farming on a big scale, a reclamation of seemingly waste lands, ready to give to Colorado new wealth perhaps greater than her mines ever did. The manufacturers' eyes have been opened to the great possibilities of Colorado and the surrounding states. Heretofore we have associated Colorado with mountain peaks and mines and overlooked its immense stretches of prairie lands.

There are about 4000 tractors doing farm work in Colorado. As a result of the demonstration this week the prediction is common that this figure will be doubled next year by the thirty-five or more tractor dealers already established in Denver. The number of dealers here possibly will be doubled before next year's demonstration is put on. All this points to the fact that a new era of power farming has sprung up in this part of the country where for years and years the sun-baked plains have remained idle. It remained for the tractors and gang plows to show that this rock-like soil could be broken up and converted into useful tracts instead of being the playground for the prairie dog.

Probably no better field could have been chosen anywhere in the country to test the mettle of the tractors and their equipment. A tractor that came through this demonstration successfully can pull its full quota of plows anywhere a tractor is at all possible. The ground was so hard the plows left a glazed surface on the edge of the furrow. Reports have it that in one or two instances a moldboard type of plow was ruined in a few hours' plowing. This may have been due to too fast plowing, for in many other instances the moldboard plow was functioning parallel with the disk type.

Disk-Type Plow

The disk-type plow is especially suited for this part of the country, where the ground is extremely hard. It reduces the draft by the substitution of a rolling friction as compared with a sliding friction. Operators at this demonstration could not take advantage of stops to clean plows of trash, as at many other demonstrations. In other words, as there was no stubble or anything else to interfere with the proper scouring of the plows, an operator had no excuse for stopping presumably to clean his plows, when in reality his engine may be overheating or some other trouble manifest itself. It was clearly a demonstration that brought out faults in any of the machines, and the manufacturers as a whole feel encouraged with the performances of their products. With virgin soil like that east of Denver, where time has packed the ground into a rock-like substance, obviously the tractors, especially some of the smaller ones, had to back up a little now and then and take another start. A piledriver does not sink a pile into the ground with one steady push; neither must it be expected that the smaller tractors with their full number of plows can go through the unscratched plains of Colorado without a halt now and then.

Potential Tractor Field

Until 1919 the tractor has not figured very prominently in the cultivation of irrigated lands, of which there are in Colorado now about 3,400,000 acres. This irrigated country is a potential field for the tractors. Objection sometimes is raised to the use of tractors in irrigated lands, but tractors are being used successfully in such lands. Most of the objections have been based on the fact that the soil is too heavy, requiring as many as twelve horses on a 12-in. or 14-in. sulky plow and that a tractor designed to pull three or four bottoms could pull but two in these lands. In spite of this fact the ratio of work done to cost per acre remains the same as between the use of horses and tractor on dry land.

Another condition that spells the general distribution of the tractor in the irrigated lands is that in these lands are found many silos, necessitating ensilage cutters and other farm machinery requiring power. Some farmers have bought expensive stationary gasoline engines for this purpose, where a few dollars more would have given them a tractor, which not only is a mobile outfit but will do everything the stationary engine will do. Where land is irrigated crops are sure, and this has given rise to the great popularity of the small grain and bean thresher, with which the tractor is indispensable. The motor cultivator promises to become popular in the irrigated lands, as was shown by the interest these machines caused at the demonstration.

The farmers who attended the Denver demonstration found the limitations of wind, rain and horsepower overcome by the tractor. Several years ago farmers of this section began to realize the importance of early plowing in summer. In this part of the country July is the logical month. But the farmer finds that after the harvest of winter wheat is out of the way his horses are not in the best of condition to tackle the land under the great heat of the midsummer sun. Haying time comes along also and the horses must be brought into action again.

Farmers here know that the wind, the weeds and sun take from the soil the necessary moisture and fertility unless some means are at hand to prevent it. The tractor is the solution, for there is no such thing as limitation to its use, as with the horse. After the wheat harvest is over the land is bare and exposed to the action of wind sun and weeds. The stubble helps to draw the moisture out of the ground and a vast amount of moisture escapes if the land has been allowed to dry and crack. This moisture must be conserved by plowing the land and disking it.

When the land here is left until fall it has become so dry and cracked that it will not pulverize properly, resulting in a lumpy field and very poor seedbed. Weather conditions may prevent early plowing but here again the tractor shows its superiority over the horse, for as soon as the ground is ready the tractor can go out and rush through the work.

One of the best features connected with the demonstration was that the great majority of farmers present were just the ones the tractor men were anxious to show. These farmers came from fifteen states, including Colorado, Utah, New Mexico, Texas, the Dakotas, Nebraska, Wyoming, Oklahoma, Iowa, Montana, Kansas, Idaho and Nevada. These men came to get a line on the tractors with the expectation of using them on their farms. Only those interested in buying tractors would put up with the terrific clouds of dust stirred up not only by the machines in the field but the thousands of motor cars coming and going. The feeling is common among the tractor dealers that there will be little sales resistance to the tractor in the mountain states. The soil conditions were typical of this part of the country, and thus the farmers could visualize the machines working in their own neighborhood.

Attendance Was Enormous

The attendance was enormous. Exact figures are lacking as to the number. Tuesday, which was Denver day, brought something like 20,000 persons, while some estimate as high as 30,000. There was a double line of motor cars nearly ¾ mile long, stretched in front of the exhibit tents, with machines coming and going all the time. Monday was given over to getting the plows and tractors adjusted so everything was in readiness for the actual plowing Tuesday morning. Plowing demonstrations were from 9:30 to 11:30 in the morning and from 1:30 to 3:30 in the afternoon of each day. Wednesday was Dry Farming

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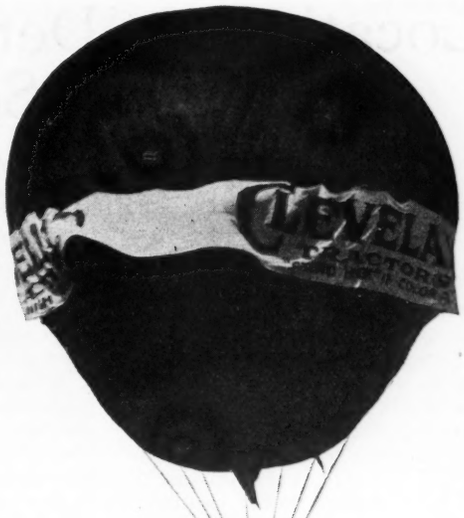


The daughter of the inventor of the Browning machine gun is shown driving a Fordson, while below is a Wallis. The balloon is an advertising stunt staged by Cleveland at Denver

The picture above was taken early in the morning at Denver and shows the cars driven in early to avoid congested roads and dust, while at the right is the big Twin City pulling twenty-four disk plows

Location to Determine Popular Tractor in South Dakota

Northern Section Needs Belt Power of Larger Size While Southern Conditions Are More Like Those of Iowa

By Fred M. Loomis
Motor Age Editorial Staff

WHAT size of tractor popular preference ultimately may select in South Dakota will depend primarily upon the location of the buyer. In the northern section the conditions are so nearly like those in North Dakota that ultimately the demand will settle on the three- and four-bottom machine. This does not mean that none of the smaller machines will be sold, but here as in North Dakota the belt power available will be the determining factor rather than the plowing ability of the machine and to take care of the size grain separators of which the larger number will be sold requires a tractor with more belt power than can be had with the small two-bottom machines.

In the district directly tributary to Sioux Falls, where there is more diversified farming, conditions will be somewhat different. Really this section of the state belongs to the corn belt and what applies regarding tractors in Iowa and Nebraska will be true of this section.

Jobbing Centers Here Too

As is the case in North Dakota most of the larger towns are practically jobbing centers for a more or less extensive territory. Also the northern half of the state is a one-crop territory, just as is North Dakota, and practically the same conditions apply. These have a decided bearing upon the extent to which the motor car interests are getting into the tractor trade and what has been reported regarding North Dakota may be repeated almost without change for this section of South Dakota.

Being a one-crop country, where small grain dominates, it is as important to the farmers of the northern half of the state that they have a tractor with ample belt power rather than drawbar pull, as is the case in North Dakota. Recognition of this fact has been given by the old-line tractor manufacturers, who for years have been selling thresher engines in this section and most of whom have branch house or transfer representation in nearly all the larger towns. Thus, distinctive agencies have been long established, and, these for the most part being in implement hands, there is not the same opportunity for the motor car interests to get into the tractor trade as is the case in states further south. Furthermore, outside the larger towns there are few of the motor car dealers who have the equipment to handle the tractor business or to give the kind of service required. As in North Dakota, the implement man is everywhere, selling motor cars in connection with implements in many instances, it is true, but regarding himself as primarily an implement man and only incidentally a motor car man.

Aberdeen is a city typical of the conditions as they exist in the northern half of the state. While many tractors are represented here only two of the well known makes are sold through automotive dealers. These are the Fordson, sold locally by the Spaulding Auto Co., and the Moline-Universal, distributed by W. C. Nissen. Nissen also will have the Pullet this year, but this is a new machine and is just going into production.

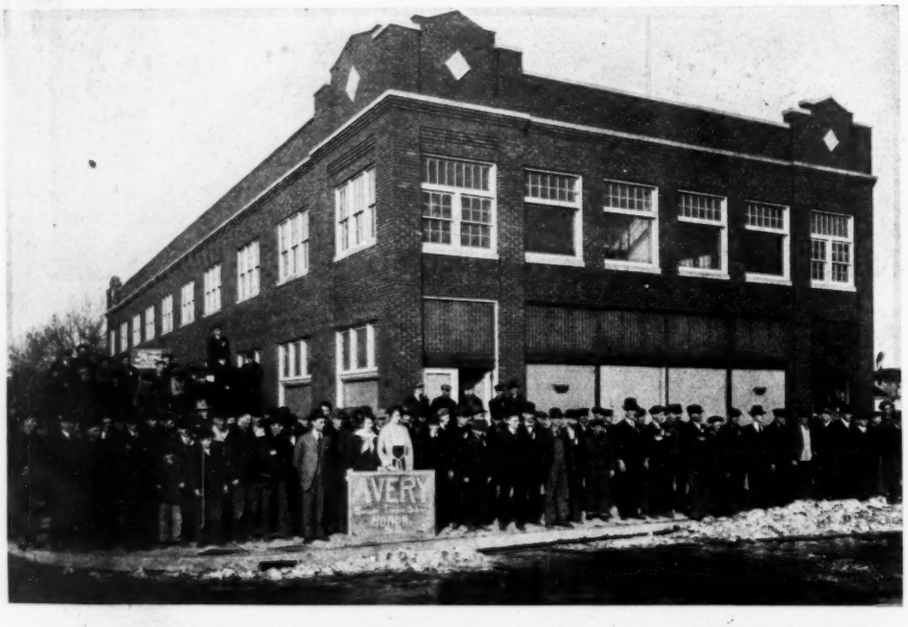
However, these two instances of motor car men in the tractor trade present methods of merchandising and enterprise typical of the better class of automotive dealers everywhere. The Spaulding Auto Co. sells the Ford and the Fordson tractor as retailers and conducts an extensive wholesale business in accessories and garage equipment. The company has a fine building and is well equipped for service. In handling the Fordson a special department has been created. The company maintains a special tractor man and a special plow man. How service is regarded by the company is indicated by the fact that the special tractor man has instructions to call on every Fordson owner once every thirty days. This is a larger measure of attention than is being given the purchasers of any other tractor in that section.

One of Leading Dealers

W. C. Nissen is a distributer. He has a branch at Watertown and others at Brookings and Doland. In addition he controls a large section of country in the upper half of the state and asserts he intends to give the motor car man the preference in placing agencies, for the usual reasons. Nissen has the right to be regarded as one of the leading automotive dealers in his part of the country, as his annual distribution of Studebakers exceeds the thousand mark. He has been interested in tractors for some time and has convinced himself that the automotive interests are the logical tractor dealers. As with other automotive dealers who are making a success of the tractor business he conducts it as a special department with special men and special service equipment.

This year he will undertake the introduction of the new Pullet tractor. The Pullet is a four-plow machine of original design and was shown to the public for the first time at the Minneapolis show. V. F. Deckert, who, under the name of the Pullet Tractor Co., is building it at Minneapolis, has been developing his machine for several years and now believes he can go to the trade with confidence in his product. For a smaller machine Nissen will sell the Moline-Universal.

Not only are all the old-line tractors represented at Aberdeen by branch houses, but so important is Aberdeen as a tractor distribution center it has been selected by the demonstration committee of the N. I. V. A. for the Northwest Na-



This is the building of the biggest automotive retailer in South Dakota—A. M. Urquhart of Huron. It shows the crowd which attended an Avery tractor school which was held there during the winter

tional Tractor Demonstration, to be held the week of Aug. 18.

In contra-distinction to Aberdeen, Huron is distinctively a retail tractor town, and thus affords an enlightening contrast. The big factor in the tractor trade at Huron is A. M. Urquhart, automotive dealer, retailing the Ford, the Fordson and the Avery tractor, with the lines of farm equipment which will be used with the tractors. He has the best and most pretentious business building in the town and has a superb service equipment with merchandising methods which are up-to-date and aggressive.

That he is successful is indicated by the fact that last year he sold 476 cars, sixty-six trucks and $85,000 worth of tractors. In the last named his principal line is the Avery. Urquhart has a long and eventful tractor experience, being one of the first dealers in the state to take on the Bull, eighty-five of which he sold in his first year.

A factor of considerable importance at Huron is F. R. Brumwell, lumber and implement dealer with several branch houses. Brumwell sells the Waterloo Boy and has been very instrumental in conducting experiments with the John Deere tractor.

Another dealer who cuts considerable figure in the local tractor situation is C. A. Campbell, implement dealer, with the Moline-Universal and Emerson-Brantingham. Of the former he has sold about twenty and of the latter six.

The Midstate Motor Co., selling Reo cars and trucks, Denby and Republic trucks and implements, very recently has taken on the Gray and Huber. The company has a good building but is not organized very well either for sales or service.

Another Distributing Center

Watertown is another instance of the distributing point, as practically every tractor which lays any claim to being in production is represented in some way in this place. Again the older and better established lines are handled through branch houses, some of them quite pretentious. For instance, the International Harvester Co. is moving into a new warehouse, which would do credit to any distributive center.

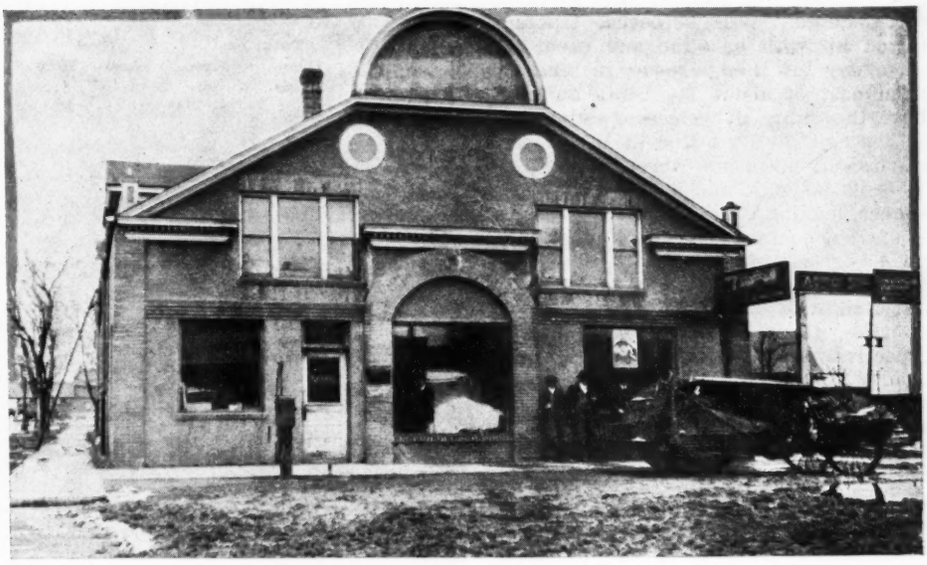
Also there is one tractor manufactured here, the Dakota. The automotive interests are well represented in the tractor trade here, but it must be confessed more as a potential factor than as a present factor of importance.

The Fanset Auto Co., selling the Emerson-Brantingham, has not had the line long enough to develop sales or service. As a matter of fact the company deals principally in second-hand cars but is planning to take on a line of cars this year.

There is a branch of W. C. Nissen here which in all probability will follow the lead of the parent house with the Pullet.

The Headley Auto Co., selling the Ford and Fordson, has a good building, a well equipped repairshop, carries a large line of spares and gives good service.

The Baskerville-Dahl Co., with Buick and Hudson has the Waterloo Boy and is a conspicuous instance of the business which makes the implement trade predominant with cars as the incidental line, although it is more automotive than usually is the case in this section of the country.



Building of the Midstate Motor Co., Huron, S. D., which has just gone into the tractor business

The Hauten Machine Co., retailing Dort and Elgin, represents the Avery and maintains a large and well equipped repairshop apart from its regular business. It is well equipped for service.

The Holt Auto Co., selling Dodge and Chevrolet, took on the Lauson last fall and expects to cut quite a figure.

The local implement houses all retail tractors of well known makes but present no points of special interest either in method or equipment for service.

Sioux Falls is predominantly a tractor distributing town. The motor car interests are not very well represented, compared with the implement interests. Tractors, however, are handled either locally or in a distributive way by the following car distributors:

Hahn-Jonas Motor Co., Hart-Parr.
Hansen-Tyler Co., Dart.
Parrott Motors Co., Parrett.
Coon Auto Co., Fordson.
Wiberg & Merches, Pioneer.

Confirmatory of the foregoing conclusions relative to the size of tractor likely to be most popular in South Dakota is the report on tractor use recently issued by the United States Department of Agriculture. This report says:

Because of the large farms in the Dakotas the small two-plow tractors have not proved popular and the three-plow outfits have been purchased in the greatest numbers. Seventeen per cent of the farmers purchased and 5 per cent recommended two-plow outfits, 56 per cent purchased and 52 per cent recommended three-plow outfits, 12 per cent purchased and 30 per cent recommended four-plow machines, while 15 per cent purchased and 13 per cent recommended five-plow and over tractors.

Another objection to the two-plow tractor was its inability to develop sufficient power for operating even the smallest sizes of grain separators.

The minimum size of farm, according to the replies, on which a tractor could be used profitably is the 185-acre farm for the two-plow outfit, 225 acres for a three-plow machine and 314 acres for a four-plow tractor. The average sizes of the farms reporting showed that the two-plow tractor was being used on 252 acres, three-plow on 303 acres and four-plow on 396 acres, these acreages in each instance being the crop acres.

The average length of life estimated by tractor owners was placed at 9.4 years by those who found the tractor most profitable and 6.2 years by those who criticised their machines. Nearly 85 per cent of the owners reported the 9.4 figure. The average machine was used fifty-one days annually.

Expense for Repairs

Out of 110 Dakota owners who had used their outfits ten months thirty-eight reported no expense for repairs. The others had bills varying up to $100, averaging $29, making the entire group average $19. The average repairs for 137 outfits between thirteen and twenty-four months old were $40. For forty-nine machines between thirty-five and thirty-six months the average was $97.

Reports indicated an annual repair charge during the first three years of tractor life of about 3 per cent of the first cost.

The two-, three- and four-plow outfits plowed 6.3, 8.5 and 10.9 acres respectively per working day of 10 hr., on an average, according to the reports.

Only 14 per cent of the owners reported doing hauling with their outfits and but 3 per cent of all the work done by tractors in the Dakotas comprised hauling.

The average quantity of fuel consumed per acre was reported at 2½ gal. and it was also stated that two-thirds of the tractors are using kerosene, finding it satisfactory and more economical than gasoline. The average price paid for gasoline was 27.6 cents a gallon and for kerosene 15.2 cents a gallon, and with these prices the fuel cost an acre aver-

aged 38 cents for kerosene and 69 cents for gasoline. All kerosene tractors started up with gasoline and used 1¼ gal. a day for this purpose, making an added cost of about 1½ cents an acre above the figure of 38 cents, estimating the average day's plowing at 10½ acres. Lubricating oil costs were reported at 7½ cents an acre, and grease at 2 cents an acre, making a total cost for fuel and oil of 78½ cents where gasoline is used and 49 cents with kerosene.

The daily average repair charge was estimated at 93 cents, $1.12 and $1.25 for the two-, three- and four-plow outfits respectively, making the repair charges an acre 15, 13 and 11 cents respectively.

Depreciation was found to be, assuming the average life of a tractor was nine years, $116.66, $161.11 and $222.22 for the two-, three- and four-plow outfits respectively, making the average depreciation an acre 41, 36½ and 31¾ cents respectively.

Man labor was reported at $4 a day, making the cost an acre 63½, 47 and 36¾ cents for two-, three- and four-plow outfits respectively. Interest was estimated at 6 per cent on the average investment and, assuming the average number of days to be annually forty-five, fifty-two and sixty-four, the average interest charge a day for the two-, three- and four-plow outfits respectively was 70, 84 and 94 cents respectively with the interest cost an acre 11, 10 and 8½ cents respectively.

The average depth of plowing done by Dakota farmers was slightly less than 6½ in., as compared with 5 in. plowed with horses and a few reported increases of crop yields as a result.

Of 281 owners 139—49 per cent—reported that their outfits were not disabled a single day when needed during the season. The remaining 51 per cent stated that their tractors were out of commission six days when needed. About 93 per cent of the tractors were reported operated by the owner or some member of his family, the best results being obtained by this class. Thirty-two per cent reported no time lost in the fields on account of trouble with the outfits. The average time lost a day by the other 68 per cent was ¾ hr.

Horses were displaced on 57 per cent of the farms where tractors were purchased and where no increase was made in the acreage farmed. An average of slightly less than four horses was displaced on each farm by the purchase of a tractor.

Approximate Cost of Plowing an Acre

Size of tractor	Total cost Gasoline	Total cost Kerosene	Fuel Gasoline	Fuel Kerosene	Other items of cost Oil	Grease	Repairs	Depreciation	Man labor	Interest
2-plow....	$2.09	$1.79½	$.69	$.39½	$.07½	$.02	$.15	$.41	$.63½	$.11
3-plow....	1.85	1.55½	.69	.39½	.07½	.02	.13	.36½	.47	.10
4-plow....	1.66½	1.37	.69	.39½	.07½	.02	.11	.31¾	.36¾	.08½

This table shows the approximate cost of plowing an acre with two-, three-, and four-plow tractors based on corresponding average costs of $1,050,$1,450 and $2,000 and the life of nine years of forty-five, fifty-two and sixty-four working days respectively a year.

The Holt Motor Co., Watertown, S. D., handles the Lauson tractor

MORE THAN 40 REOS DAILY

Lansing, Mich., June 14—The Reo Motor Car Co., which now claims the world's record for truck manufacture for the first quarter of the year, averaged 30 per cent more cars in May than the average production for the first quarter. The company is producing from forty to fifty trucks daily.

PROTECTING ROADS FROM CLEATS

Harrisburg, Pa., June 14—The bill regulating the use of tractors having cleats on state highways has been reported to the house with amendments whereby machines not deemed damaging to the public highways are made exempt.

Next winter the state highway department will send out questionnaires on each tractor, and those shown to be harmful to the highways will have to be remedied or they will be denied a license.

DEALERS GET GOOD ROADS FOR COUNTY

Rockford, Ill., June 14—Early last fall several of the leading car dealers of this city decided it was time to get together and cut out talking and get some good roads for Winnebago county. As a result of this determination the Winnebago County Good Roads Association was formed with Jud S. Joslyn of the Joslyn Auto Co. as president, W. H. Williamson of the Williamson Motor Co. as vice-president, M. R. Bird of the Rockford branch of the Packard Motor Car Co. of Chicago as secretary and treasurer.

The first thing the association had to have was money to finance its campaign, so letters were sent out to 4500 owners in the county asking that each contribute a tenth of the price of a tire on his car. In this way ample funds were secured to put over a well-devised campaign for good roads in the county that resulted in the voters casting an overwhelming vote for the 63 miles of good roads that the plans call for construction in Winnebago.

The officers of the County Good Roads Association worked early and late to make the campaign a success and one of the best methods used was one of them to address meetings of the farmers at some central place in the county and show them the economic value of good roads. An officer of the club would address the meeting on the state aid to good roads and explain what became of the license money the state collected, then the highway engineer would show the audience with the aid of blueprints what 63 miles of good road would do for the farmer, increasing steady markets for his products and that a tax levy of 50 cents for each $100 assessed valuation would result in a fund with the aid from the state would accomplish the desired results.

An analysis of the vote cast for the measure showed that the farmer voted solidly for the good roads bill, while the city folks who paid 70 per cent of the taxes were just as strong for the additional tax. The laboring man who owns his own home in the city would have to pay at least $5 a year to meet the good roads tax, but the vote showed he was heartily in favor of meeting the additional expense.

Plans are being worked out now to open the actual building of the county highway system this year, and by 1920 the construction gangs will be hard at it to make Winnebago county an object lesson what can be accomplished for good roads when a determined effort is made by the motor dealers to put the good roads before the people in the proper manner.

PLANES FOR 12% OF VALUE

Washington, June 14—The Air Service has sold the Curtiss Aeroplane & Motors Co. 1616 JN4-D Curtiss planes without engines, 1100 Standard J-I planes without engines, with accessories and equipment of these planes included in the sale, for $2,272,000, which is 12 per cent of the original value of the planes estimated at $22,500,000. The Air Service discontinued the use of the SJ-I plane last summer and declared the JN4-D "obsolscent" recently.

This is typical of the crowds that surrounded the cultivators all during the Blue Mound demonstrations

Motor Cultivators Exhibit Their Ability

Demonstration with Horse-Drawn Vehicles Prove Them Equally as Good

SPRINGFIELD, ILL., June 13—The motor cultivator is beginning to excite the same degree of interest among farmers the tractor used to. When, right in the midst of corn cultivation time, with weeds growing every minute of the day and night, hundreds of farmers can be attracted out of their fields and held practically for all of one day, there must be a good and sufficient reason for it. The motor-driven corn cultivator is the reason.

The Macon County Farm Bureau and the University of Illinois combined forces to hold the second annual Corn Belt Corn Cultivator Demonstration Thursday and Friday of this week on the W. M. Perrine farm near Blue Mound, Ill.

Ostensibly the purpose of the demonstration was to emphasize the advantage and economy of the two-row corn cultivator, whether horse-drawn or motorized. In effect, and as the most interesting thing to the hundreds of farmers who came during the two days, it was a practical demonstration of motorized corn cultivation in comparison with horse cultivation.

Work Equally as Good

At the conclusion of the day's work, none but an expert, perhaps, could have gone on to the field and said: "Here went a horse-drawn machine, and there went a motor cultivator." So fully developed has the motor cultivator become that its work is indistinguishable from that of the ordinary horse-drawn cultivator. Motorized cultivation of corn has arrived.

Two general-purpose tractors, the Moline-Universal and the Allis-Chalmers, with the Emmerson-Brantingham, the Avery, the International Harvester Co., and the To-Ro motor cultivators worked side by side with two-row horse-drawn cultivators of Emmerson-Brantingham, Deere, Moline, Racine-Sattley, Tower and I. H. C. makes.

In quality of work, in speed and in general efficiency there was nothing to choose between the new and the old. Speed is no advantage to the motorized implement in corn cultivation, and the tractors, motor cultivators and horse-drawn machines all moved at horse pace. The only apparent advantage the motorized cultivator had over the other was its greater power, not often required, and its ability to work untiringly. As a demonstration of relative efficiency, the motorized implement showed no real advantage over the horse-drawn implement.

"The farmer who would pick flaws in the work the motor cultivators are doing here to-day is a crab," said another.

"But what I can't see," said a third, "is why I should buy a motor cultivator when I have my horses. Three horses and a two-row cultivator will do as much corn plowing as a motor cultivator, and I think it is easier on the driver."

This means that in selling the motor cultivator the dealer will have to show that it can do something besides cultivate corn if he expects to get the farmer to buy it. It must be demonstrated in other ways. The farmer must be shown that it will plant corn as well as cultivate it, that it will do all the team work on the farm, such as pulling a binder, a mower, a hay-loader, a manure spreader, etc. Of course, it will do all these things, but the farmer doesn't know it, or at any rate he does not realize it yet, and he won't be impressed by the fact until he is shown.

There is immense and widespread interest in the motor cultivator. The turnout of farmers at the Blue Mound demonstration proved this, but as yet it is passive interest, at the most curious interest, and the dealer who tries to sell the motor cultivator undoubtedly is going to encounter considerable sales resistance. On the showing of the machine as a mere cultivating machine, there are no such obvious advantages over horses to appeal to the farmers as there are in the case of the tractor.

Nevertheless, the motor cultivator has arrived, and it is here to stay. Furthermore, it undoubtedly has a great future in all sections of the country where row crops are grown extensively. But it must be sold as supplementary to the tractor. As such it will assist in overcoming one of the most obstinate of the objections now advanced by the farmer to explain why he does not buy a tractor, namely, that he must keep his horses for his corn anyway, so why not use them for all his work and do without the tractor.

As soon as the dealer will show the farmer that with the motor cultivator he can do all his present horse work except road hauling, the main stock objection to buying a tractor will have been met. The tractor and the motor cultivator, aided by the truck, can and will motorize the farm. It merely is up to the dealer to demonstrate the combination.

"There's still some bugs in 'em," said a well known engineer who was at Blue Mound looking on, "but that machine's come to stay and don't you forget it."

U. S. RUBBER PLANS ON BIG SCALE

Detroit, June 13—The United States Rubber Co. will spend $3,000,000 this year in extensions and equipment to the works of Morgan & Wright, its subsidiary unit here. Officials of the company believe the gross business for 1919 will be between $250,000,000 and $220,000,000, the former figure being the sales record for last year.

TO REVIVE WOLVERINE CAR

Kalamazoo, Mich., June 13—The Wolverine Motor Car Co., which suspended business on account of the war, is being revived and the manufacture of cars will start soon. The capital stock, $250,000, is to be sold at once. Two cars are now being made. One is a coupe and the other a touring model. They will sell at about $4,000.

McNAUGHTON SUCCEEDS HOWARD

Detroit, June 14—Lynn McNaughton has been appointed general sales manager of the Cadillac Motor Car Co., succeeding Earle C. Howard, who recently resigned. Mr. McNaughton has been with the Cadillac sales organization for fourteen years, and assistant to Mr. Howard since 1913.

Beneficial Truck Service

How Proper Inspection Anticipates Trouble

Start them right and keep them going right—that's the real way to market trucks. A sale that stays sold, that makes the owner a booster, means more sales

By Harlan C. Skinner

Motor Age Editorial Staff

TRUCKS are judged largely by economic comparison. We know that a truck continually laid up for repairs is a poor investment. This may result from improper attention to the care of the truck or an inherently poor vehicle. Proper inspection at regular monthly intervals keeps a truck in service and reduces repair costs to a minimum. Truck inspection is a trouble anticipator.

Distributers and dealers who employ this method of serving their truck owners have proven it to be very satisfactory. To carry out the idea successfully, some predetermined plan must be put in force so that both the owner and the distributer will secure the maximum results from such an inspection. Then, some type of form must be developed which will show the mechanical condition of the truck and be educational in its nature for the benefit of the truck owner. Such a form is shown below. If, during the course of the inspection, it is found that something serious is developing in the truck, due to neglect, then the inspection report can be accompanied with a letter giving detail information as to how to prevent the recurrence of this trouble when the truck inspection report is mailed to the owner.

Insist that the owner have his truck operator present during the inspection. Thus the inspection can serve the dual purpose of being educational to the truck driver and at the same time check the mechanical condition of the truck.

The inspector should be a competent service man familiar with all of the mechanical details of the truck. At the time of delivery of the truck such a man should accompany it, explaining to the driver the dangers of overloading and overspeeding a new truck, and that it should be handled carefully until the engine is well broken in. General advice regarding the operation of the vehicle should be given, laying stress upon the peculiar characteristics of the truck.

Dangers of racing a cold engine when warming up in the morning should be dealt with, explaining that during the night the cylinder walls of the engine have been drained of lubricating oil, due to standing, and that racing the engine is liable to score the cylinder walls and pistons. An engine will warm up just as fast when idling as when racing, and will not be nearly so liable to pass the unburned portions of the fuel into the crankcase and dilute the oil. Emphasis should be laid upon the fact that the amount of unburned fuel passing the pistons and diluting the oil is at its maximum when the engine is cold. A little precaution here saves changing the oil so often, especially in cold weather. These and other facts of parallel interest should be talked about. Start the truck right.

The first inspection that a new truck receives is a very important one. If the inspector is on to his job he will be able to tell just how thorough the driver has been in the care of his truck, and this is an important bit of information for the distributor, as he will be in a position to tell the owner that his driver is or is not up to the standard that he must employ in order to have the truck give satisfactory results.

The advantage of these inspections is that they reduce trouble to a minimum by locating any defect which may develop before it becomes serious enough to cause any real damage. Sufficient space should be left at the bottom of the form to permit the inspector to make a statement regarding the lubrication that the truck has received, and also any suggestions that may be beneficial to the concern operating the truck.

All reports should be made in duplicate, one to be mailed to the truck owner and the other to be retained for the distributer's file.

Various means are used in covering the expense of these inspections. Some concerns charge for the labor and material used, while others charge only for the material used, provided the truck is delivered to their service station. Some have worked out a definite schedule and have divided their territory into zones, the charge for the inspection increasing as the zones become farther away from the central service station. In the latter case the inspector's time, the material used and the transportation for the inspector to any one zone must be considered. From the experience of previous inspections, it would be possible to work out and adopt a standardized inspection charge for each zone.

Monthly Truck Inspection Report

Owner ..... Date .....
Engine No. ..... Model ..... Mileage .....

1. Is radiator full?
2. Is anti-freeze required?
3. Is fan belt tight?
4. Is water hose in good condition?
5. Are all water joints tight?
6. Are crankcase to frame bolts tight?
7. Is carbureter adjustment correct?
8. Are gasoline screens clean?
9. Does carbureter choke properly?
10. Is compression good?
    Cyl. No. 1.., 2.., 3.., 4.....
11. Are valves properly adjusted?
12. Should valves be ground?
13. Should carbon be cleaned?
14. Has engine normal power?
15. Does governor operate properly?
16. Is crankcase oil up to level?
17. Should oil be changed?
18. What is oil pressure, motor idling?
19. Are ignition breaker points clean and properly adjusted?
20. Is distributor board clean?
21. Are spark plug gaps correct?
22. Does clutch brake work properly?
23. Is clutch action smooth?
24. Name any points which show that proper lubrication has been neglected.....
25. With starting and lighting system:
    (a) Commutators and brushes clean?
    (b) What is voltage across generator brushes?.....
    (c) Is battery watered?
    (d) Are connections good?
    (e) What is the gravity of each cell?
    Cell No. 1.., 2.., 3..
    (f) Are lamp bulbs good?
26. Are universal joints in good condition?
27. Are wheel bearings properly adjusted?
28. Is steering properly lined up?
29. Are steering connections tight?
30. Is foot brake properly adjusted?
31. Is hand brake properly adjusted?
32. Should brakes be relined?
33. Are spring clips tight?
34. Is torque arm tight?
35. What is condition of tires?
36. What is general condition of truck with regard to cleanliness? .....
37. Is truck overloaded?..... How much?.....
38. Is truck operated intelligently?
39. Are there any matters requiring attention not already covered? .....

Signed..... By.....
Distributor. Inspector.

Garage Planning
Service Station Arrangements

MOTOR AGE is receiving many inquiries for garage plans which do not give sufficient information to permit an intelligent reply. There are certain things which should be known to lay out the proper plan for a garage, and inquiries are urged in asking for such plans to be sure to include the following information:

Rough pencil sketch showing size and shape of plot and its relation to streets and alleys.

What departments are to be operated and how large it is expected they will be.

Number of cars on the sales floor.

Number of cars it is expected to garage.

Number of men employed in repair shop.

And how much of an accessory department is anticipated.

No. 65

Garage with Long Front

Q—We are planning to build a garage 75 by 140 ft. on a corner lot. We would like to have a showroom capable of holding four cars and also room for two or three glass showcases on the main floor with a stockroom for small parts, ladies' restroom, general office, private office and shop large enough to handle four or five cars. The rest of the space will be used for storage.—Osborne & Hunter, Anaconda, Mont.

Since you consider Oak street the best for business it would seem desirable to stretch your showrooms and accessory store along this side. With two rows of cars and a suitable aisle between 28 ft. would be left along the front for the showrooms, offices, etc. This makes a very good width of space to use, but the length is rather great. If your garage or storage business is the large end of your business, then this arrangement might be improved, but if you are going after sales and service we think it is about right. The open space inside the Oak street exit would be very handy for oiling cars, inspection and diagnosing troubles. The service counter located here is for the handling of parts, battery and tire repairs. If you do not contemplate doing these things, this corner would give storage space for about eight small cars in two rows, or the aisle could be moved slightly to he left at the expense of the car showroom and give space for large cars.

You speak about the main floor but say nothing about more than a one-story building, so we have planned it as such. Should you have a second story in mind the same plan would hold good except that the repairshop should be moved to the upper floor. A ramp could be installed on the alley and turning into the central aisle on the second floor as indicated in our small stretch. Such an arrangement would increase the storage space by sixty to seventy-five cars.

No. 66

Needs More Width

Q—I am about to go into the repair, garage and accessory business, including gas and oils, and will handle a new car. The building I will use is 40 by 100 ft., concrete floor, one-story brick, on the main street and on the corner. I intend to equip my shop with latest improved machinery, and install storage battery system. I may employ four mechanics and one boy for oil and gas. I have an opportunity to buy all the wire framing necessary for a partition for repairshop and stockroom. I am located in the county in a very thickly populated town, adjacent to the city with a publication of about 17,000.—Samuel Berman, Beckley Ward-Norfolk, Va.

The first suggestion we would make is that you trade your building for one a little wider, say 10 ft., as this width is not practical. Of course, it is not impossible, but you either are crowded for space to maneuver cars in the garage, or you have too large a waste space in proportion to that which you can utilize. Again with a 40-ft. width, a good arrangement cannot be made with a center entrance in front. After your 10-ft. driveway is taken out you only have 14 ft. available on either side for car display and accessory sales. You can never make it anything but a second-rate establishment.

If you cannot make a change, it would be better to eliminate entirely accessory and car sales and have a strictly storage garage and repairshop. Then your office could be in the corner as you suggest, and the shop in the rear as we show it.

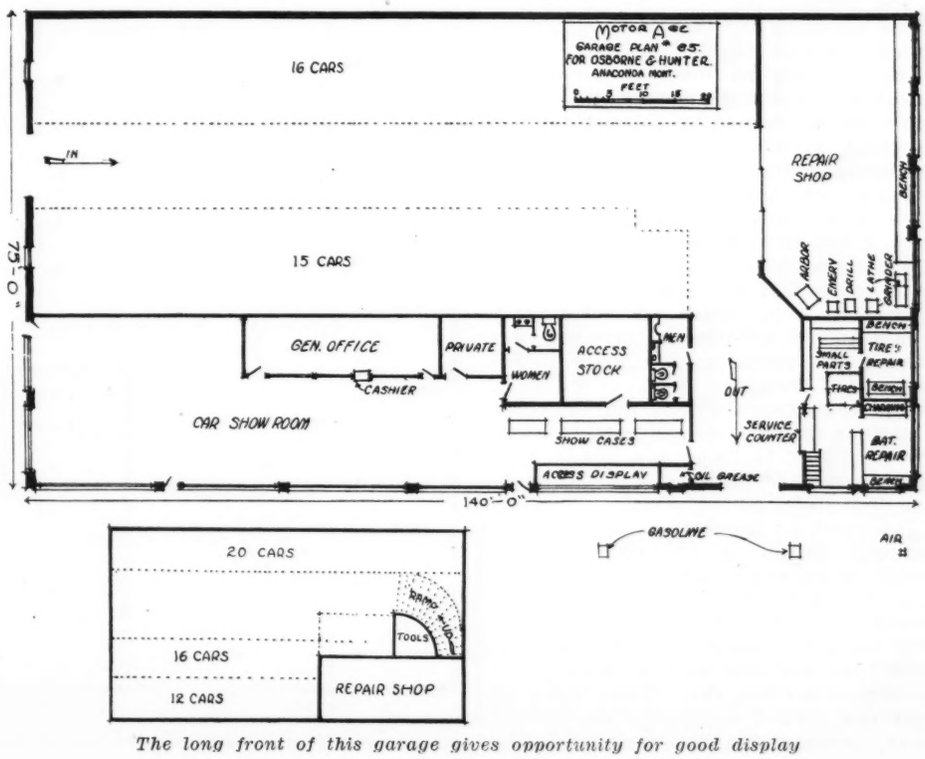
Our plan calls for some alterations in your building but is the only feasible scheme we can think of to get in all the departments you want without cutting down the storage space till it is of no value. The side door should be made large enough for cars and windows inserted along the side to give plenty of light in the salesroom and office. This might work out pretty well but does not leave a very wide aisle to maneuver cars in.

No. 67

Little Room for Storage

Q—We are contemplating building a garage 25 by 120 ft. We would like showroom for one car, arranged so we could have our accessories there also, with shop large enough for two or three men and balance of room for car storage. The building is to be two stories, with lodge room above, main hall 50 ft. long and the front arranged for office rooms.—Okeene Auto Co., Okeene, Okla.

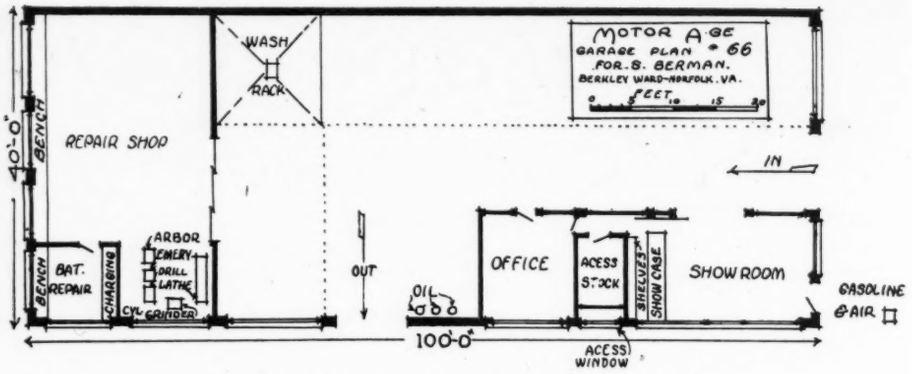
If your lot were not on a corner so you could get in to the back from the side street, we would think 25 ft. altogether too narrow for a garage. As it is MOTOR AGE recommends very strongly



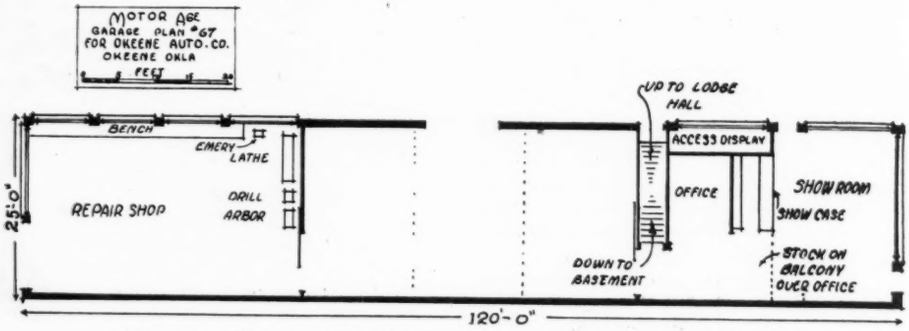
The long front of this garage gives opportunity for good display

that the use of such narrow lots be discontinued. They are of no use at all for storage. As a repairshop they are useful but even then they allow very little room for housing cars undergoing repairs.

If you anticipate doing much business it would be better to use this building for sales and repairs only, and get another for storage. We think it foolish to try to do anything in the storage line in this building. You might get room for three more cars than we have shown by taking 6 or 8 ft. from the repairshop and the same amount from the office, but at best you would only putter along with no possibility of getting far. Another alternative would be to discard the accessories and use the whole front end for a garage. Then if you wanted to show a car you could do it right on the garage floor. This arrangement would cut down the overhead, but you should keep the garage up in spick and span order.



Garage with entrance and exit on different streets



There is little room for storage if there is much repair business

No. 68

Large Feed Barn Remodeled

Q—The building we have is 150 ft. square and has been built with stalls for a feed barn. There is a main street on south and east and alleys on west and north, all paved but the north alley. There is a place in the center of the south side about 40 ft. square built in with three rooms downstairs and two up. This portion is higher than the rest of the floor but is not strong enough to hold cars. There is toilet and water here, and on each side of these rooms is a big door, also one door in the center at the north end.

We would like to use this for a garage and repairshop and have plenty of room for from forty to fifty cars. We would expect to build the front rooms some larger and make room for three to six cars in showroom and at least one tractor.

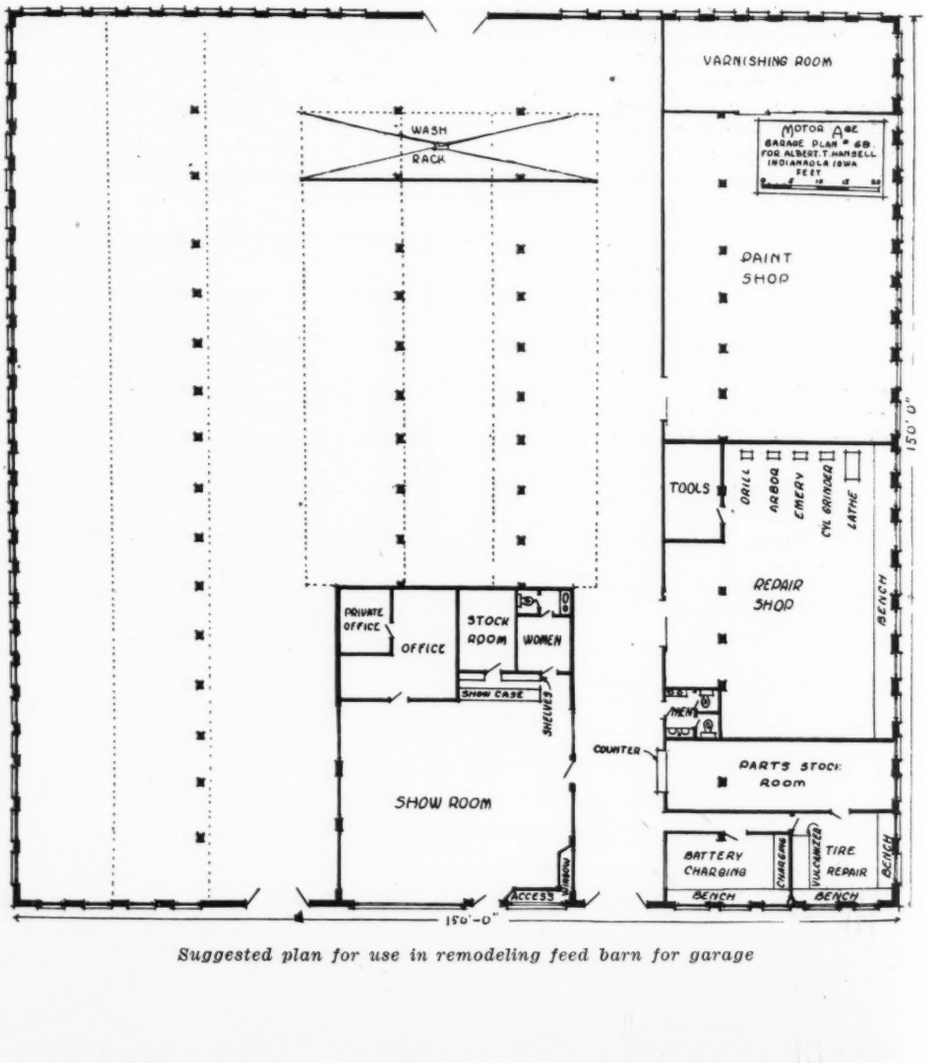
What is the best way to heat this building? There is one furnace under the front part. The front of this building sets back about 10 or 12 ft. from the curb, and we had thought of putting a porch of some kind out over the sidewalk in the center of the building.—Albert T. Hansell, Indianola, Iowa.

The position and number of posts is a great handicap to the making of a good layout for your garage, but as we show it, there is only one row that is seriously in the way, and if the construction would allow of elimination of every other one of these without too much expense, a considerable amount eventually would be saved in wrecked fenders, etc.

To store cars along the west walls they would have to be backed between the posts while turning out of the aisle, not an easy feat where the posts are not over 7 ft. 4 in. apart. Added to this would be the difficulty of avoiding cars already in position against the wall and behind the posts.

The two center rows of posts are not a serious problem as the cars between the rows may be those that are in dead storage or undergoing repairs and so do not need to be moved often.

Inasmuch as the floor of your central inclosed portion is not very good, it would be better to tear it out and lower it to the level of the other floor. You would be wise to lay a concrete floor over the whole building, as it would reduce your fire risk and be more satisfactory in the long run. Plank floors so near the ground constantly are rotting away, settling and becoming unsightly



Suggested plan for use in remodeling feed barn for garage

through breaks. They also harbor rats and other undesirables. We have left the side walls of this central portion as they were but have enlarged the room for offices and salesrooms by extending ing it farther to the rear.

Steam heat would be the best for an extensive building of this sort, as it would be very hard to get distribution with any other system. For best results, a small basement should be excavated somewhere, probably under the office and showroom, as you say this already has some sort of a cellar and it has the advantage of being centrally located.

There is no good reason for building a porch over the sidewalk. It would darken the showroom. An awning would be better.

No. 69

Space More Than Ample

Q—The number of cars on sales floor will likely be not over three of Ford type, including Fordson tractor. Do not expect to house many cars, as population is only 500 and sales and service work will be mostly rural. We will always have outside storage for use in storing cars in dead storage, which eliminates the necessity for stock purposes and would not likely need active storage for more than eight to a dozen cars. The principal object of the building will be for ideal sales and service for Ford and Fordson, including the painting and radiator work, with three to five workers.—B. C. Ruggles, Riceville, Pa.

As nearly as we can tell, you have more than twice the space you need, in fact, we have planned a building that would take care of the Ford business for miles around.

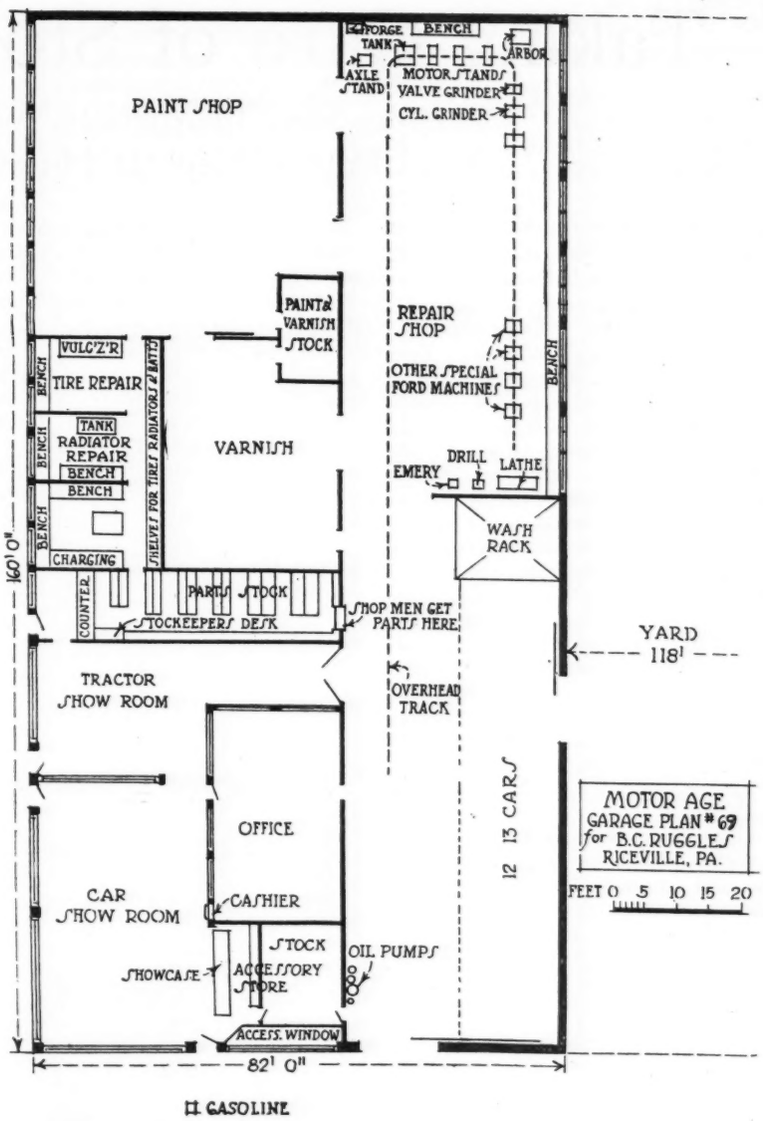
With proper system and the help necessary, the capacity for service of this plant would be almost unlimited if nothing but Ford cars and tractors are handled. Cars would not be taken into the repairshop to any extent, unless work was to be done on the running gear, but would be kept outside and the disabled parts run in on the overhead track. This conveyor would be used to shift them from one operation to another with a minimum of effort.

You no doubt will have a complete stock of Ford and Fordson parts and we have arranged the stockroom handy to the salesroom but entirely separate, so that customers for parts will not have to pass through or enter it. The stockkeeper has sole access to the stock and dispenses parts to the repairshop; also handling receipts and deliveries of tires, radiators and battery repair and charging.

Most dealers separate their tractor and car sales, and we have followed their lead by arranging two stores, the one for the cars occupying the prominent space, with the tractor beside it.

Laying Out Garages

Washington, Editor MOTOR AGE—The service you have been rendering the automotive industry through advice on Garage Planning in MOTOR AGE is to be commended, and I have been noting same with the greatest of interest. I have spent the last five or six years studying service station layout and in that time have formulated several principles, which may be of interest to you in this work.



This building will care for Ford business for miles around

I notice that most of the people asking plans contemplate a car salesroom, a repairshop and a garage. A garage and repairshop are all right, and a salesroom and shop are all right, but a salesroom, shop and garage invariably leads to difficulty in the shop.

When a man puts up a salesroom and takes the agency for a car or truck, the surest way he can build up his business is to take care of his customers by establishing a real repairshop, equipped with good tools and with a foreman in charge who knows the vehicle the agent is selling. However, when this man puts in a garage too, the shop invariably suffers from lack of supervision and the petty demands made on it. People with cars in the garage absorb much of the shop foreman's time and want a multitude of little jobs done "right away," which leads to pulling men out of the shop off real repair work. A repairshop of correct size for the agent's territory, well handled, becomes a paying investment, and why add a disorganizing element—the garage—which does not build up the business?

If the man wishes to go into the garage business also, then for his own best purposes have him operate in an entirely separate building, with its own shop and organization.

As to the various-sized plots, on which people propose to put up buildings for garage and shop purposes, some of these are so narrow—30 ft.—or so boxed in that any building which can be put on the property does not lend itself efficiently to the work to be done. I have considered it my duty, in connection with my work, more than once to discourage a man from putting up a building on property of such size or location as to be, in my mind, entirely unsuited for the purpose. A little later these people have located property of dimensions that best met requirements.

I think that all repairshop buildings, put up to-day, should provide for handling trucks 16-18-20 ft. overall, which means that service stations, wherever possible, should be built 60-70 ft. wide, with center aisle at least as wide as length of vehicle.

The whole matter of motor vehicle maintenance is one deserving the most careful study, and thought, as to policy, adaptable buildings, tools, equipment, methods and quality of repair, organization, etc.—J. Willard Lord.

Taking Care of Storage Battery

Step-by-Step Instructions Whereby This Vital Part Is Kept at Highest Efficiency

THE following instructions are given in order in which they should be performed in caring for a battery.

In order that the battery meet the demands placed upon it, it is absolutely essential that the plates be covered with electrolyte and that the electrolyte be ½ in. above the tops of the plates at all times. The depth of the electrolyte standing above the plates can be determined in a very simple manner, as shown in Fig. 1. A hollow glass tube is inserted in the vent hole of the battery until it reaches the top of the plates. The thumb then is placed over the upper opening of the tube to prevent the admission of air and is withdrawn. As the electrolyte will not run out of the tube, whatever electrolyte remains in the tube after it is extracted is an accurate register of the depth of the solution. The electrolyte brought up in the tube for testing purposes should be returned to the cell from which it was taken.

Nature of Electrolyte

Electrolyte consists of water and sulphuric acid. The water will evaporate, while the acid does not. The rapidity with which the water evaporates depends on the conditions of charging. For instance, if a car is driven constantly during daylight hours and is used very little at night, the storage battery is very likely to be continually overcharged and may need additional water as many as three or four times in a week, whereas under ordinary conditions, that is, the driving being divided between day and night, once a week would be sufficient.

Even with the use of the car being intermittent, the battery should not be permitted to go for more than two weeks without inspecting it for the proper level of electrolyte and adding distilled water if necessary. It is the opinion of a great many that no water, unless it is distilled, can be used in the battery without harming it, but fresh rainwater, which has not been collected in or allowed to stand in an iron receptacle, or any city water which will pass the inspection of the battery manufacturer can be used with equally as much satisfaction as distilled water.

While instructions say the electrolyte must not reach a level lower than ½ in. above the plates it must not be assumed that the level can exceed this by more than ⅛ in., for if filled above this level the battery will flood when charged, owing to the expansion with the increasing temperature. It is advisable to add the water just before the car is being taken out for a run of several hours.

When the level of the electrolyte falls below the specified level it is due ordinarily to evaporation of the water, and the difference should be made up of water only. It being understood that the acid does not evaporate under ordinary conditions, there should be no reason for the adding of acid to the electrolyte during the life of the battery. When a jar is cracked and leaks or is upset, and a part of the solution is lost, the loss should be made up of electrolyte of the same specific gravity as that remaining in the cell. Full strength acid or water alone should not be added. To apply the acid would make the solution too strong, while the addition of the water alone would render the solution too weak. Consequently, unless acid is actually known to have escaped from the cell none should ever be added to it.

Along with the care of the battery is included the testing of it, as a test will indicate the particular care the battery is in need of. For this the hydrometer is used. The specific gravity of a liquid is determined with the use of an instrument which will contain the certain liquid and float a glass weighted tube which is graduated in figures representing the gravity of the liquid. This is the hydrometer. The type of hydrometer shown in Fig. 3 will be found the most convenient of the various types. To test the gravity of the electrolyte of a certain cell squeeze the rubber bulb of the hydrometer, place the small end of it through the vent hole of the battery so it reaches below the level of the solution and release the bulb, thereby drawing a quantity of the electrolyte in the glass chamber. The reading can be obtained by noting the figure of the scale in line with the upper level of the electrolyte.

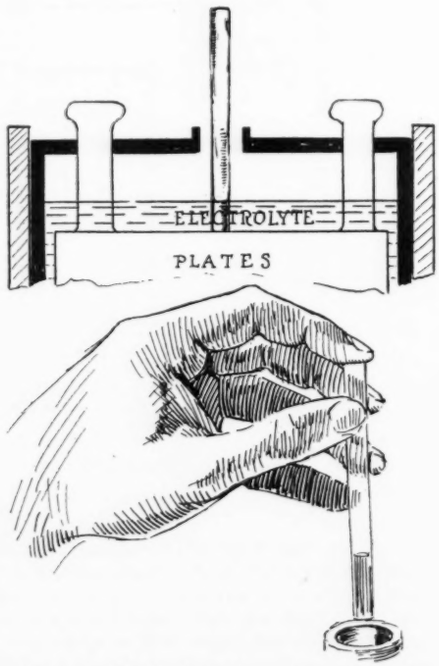


Fig. 1—Method of determining height of electrolyte in storage battery

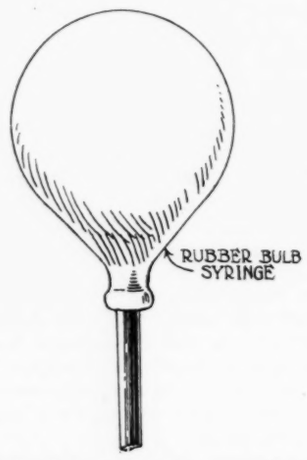


Fig. 2—Glass and rubber syringe for adding water to battery

Care with Scale

Care should be taken that the glass tip of the scale does not rest against the side of the glass chamber, which may cause the scale to stick to it and an improper reading. After having obtained the reading of a certain cell, be sure the solution is returned to the same cell from which it was taken. Failure to replace the electrolyte in the cell from which it was taken will destroy the uniformity of the cells. For instance, if the electrolyte which has been taken from No. 1 cell is replaced in No. 2 cell, the shortage of No. 1 cell will be made up by the addition of water, and the electrolyte of that cell will be weaker while the electrolyte of No. 2 cell will be correspondingly stronger.

A cell, when fully charged, should produce a hydrometer reading of 1260 to 1300 and 1150 when fully discharged, but there are certain conditions under which the hydrometer test is misleading. For instance, if water has been added to the battery just before making the hydrometer test, the reading would be misleading because it would show the cell to be nearer a discharged state than is actually the case because of the low specific gravity of the electrolyte. The reason for this is that the additional water does not combine with the electrolyte until the battery has been on charge for some time. If, on the other hand, fresh electrolyte or pure acid has been added, the test will show the specific gravity much stronger than it really is. To arrive at an accurate reading of the specific gravity of the electrolyte it is very necessary that the reading be taken before the addition of water or acid.

When the specific gravity in any cell tests more than twenty-five points lower than the average of the other cells it is an indication that particular cell is out of order. However, when there is any question as to the specific gravity a conclusion should not be arrived at from a single reading. Take several readings and average them. Variations in cell reading may be caused by internal short-circuits in the cell; by the addition of too much water

in the cell, causing a loss of electrolyte through overflowing; or by loss of electrolyte from a leaky jar. A broken separator or an accumulation of sediment in the mud space of the jars which eventually reaches the bottom of the plates. Permitting the electrolyte to become too low is responsible for the majority of all battery troubles. The effect of this is to tend to weaken the battery and cause harmful sulphating of the plate, which cause the battery to discharge more readily. When sulphating occurs it permits the plates to come into contact with each other, thereby causing an internal short-circuit.

Probably the most common cause of low electrolyte in the battery is a cracked or leaky jar. If a certain cell continually requires the addition of water more than the rest, it is an indication that the cell is leaking because of its being broken or cracked. When all the cells of the battery require water at unusually frequent intervals, it is an indication that the battery is constantly being overcharged. When a leaky jar is found it should be replaced immediately, because the cell itself will be ruined, and this is very apt to result in very serious damage to the remainder of the battery.

The storage battery should be given the greatest care. Give it water as you would give yourself food; have it repaired when necessary the same as you would call on a physician if you yourself were not in first class condition. Care is the life of the battery.

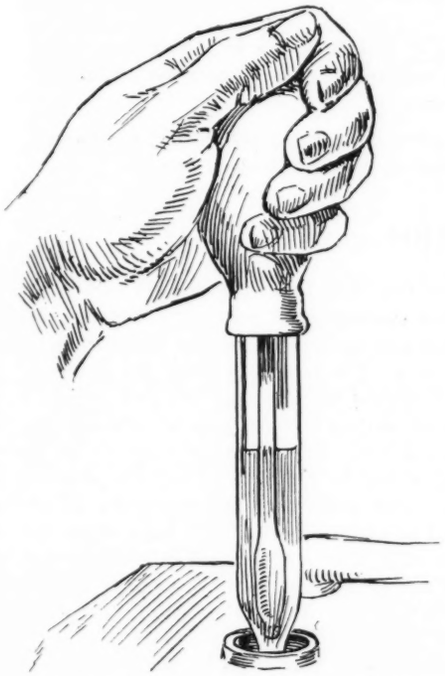


Fig. 3—Ordinary type of hydrometer syringe for testing battery

The Farmer as a Truck Prospect

Traffic Dealers in Convention

ST. LOUIS, June 14—The possibilities for the sale of motor trucks to farmers were emphasized by Guy Wilson, president of the Traffic Motor Truck Corp, of St. Louis, speaking to the 225 dealers who came to St. Louis to attend the first convention of dealers. Mr. Wilson asked these questions:

"How long will the farmer be satisfied with the slow process of moving his produce by teams when he, himself, travels from 25 to 60 m.p.h. in his own touring car?

"Will he be satisfied with a team making 10 miles, we will say, in 2 hr., when a truck will make it nicely in 30 to 40 min.?

"Don't you know that the passenger car has educated the farmer to the point where he will be satisfied with nothing less than quick transportation of his produce?"

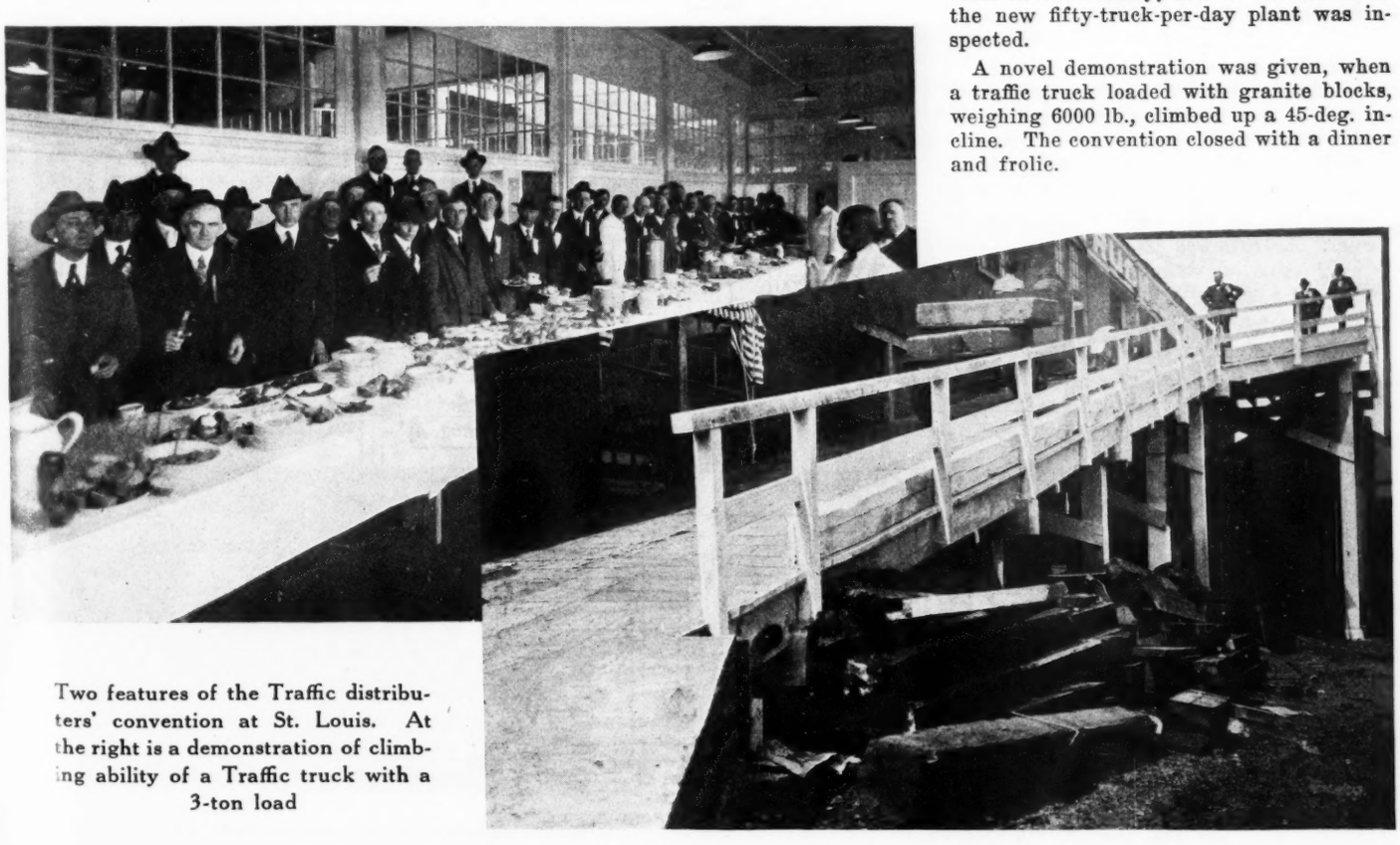
Mr. Wilson declared that when dealers realized this and that the same rule applies to the city business man they will begin to get some conception of the possibilities of the motor truck.

"The motor truck opens up new avenues of progress for the farmer. The farmer of to-day with a truck living 40 miles from a railroad is for all practical purposes no further from his market than the farmer of yesterday without a truck living 10 miles from a railroad."

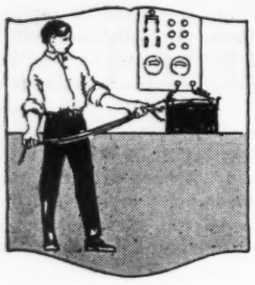
Robert E. Lee presided as toastmaster at this dinner, and the speakers included United States Senator Spencer, who delivered a patriotic talk, W. C. D'Arcy, president D'Arcy Advertising Co., Breckenridge Jones, president Mississippi Valley Trust Co., who pointed out the advantages of trade acceptance; Paul G. L. Hilken, president Traffic Truck Sales Co., Baltimore and Philadelphia; F. D. Walker, Omaha dealer, H. H. Hawke, sales manager and T. C. Brandle, vice-president of the corporation.

The convention lasted two days in all. The first morning the guests were taken for a motor car ride over the city. A buffet luncheon was served in the new dining room at the factory, and in the afternoon the new fifty-truck-per-day plant was inspected.

A novel demonstration was given, when a traffic truck loaded with granite blocks, weighing 6000 lb., climbed up a 45-deg. incline. The convention closed with a dinner and frolic.



Two features of the Traffic distributers' convention at St. Louis. At the right is a demonstration of climbing ability of a Traffic truck with a 3-ton load



Electrical Equipment of the Motor Car

By David Penn Moreton & Darwin S. Hatch.

Editor's Note—Herewith is presented the 151st installment of a weekly series of articles begun in Motor Age, *issue of June 29, 1916, designed to give the repairman and motorist the knowledge which will enable them to care for and repair any and all of the electrical features of the car, no matter what make or model it may be.*

The first half of this series has been published in book form by the U. P. C. Book Co., Inc., 243-249 West Thirty-ninth street, New York, and is sold at $2.50. The remainder of the series will be published as a supplementary volume.

Part CLI—Leece-Neville Systems

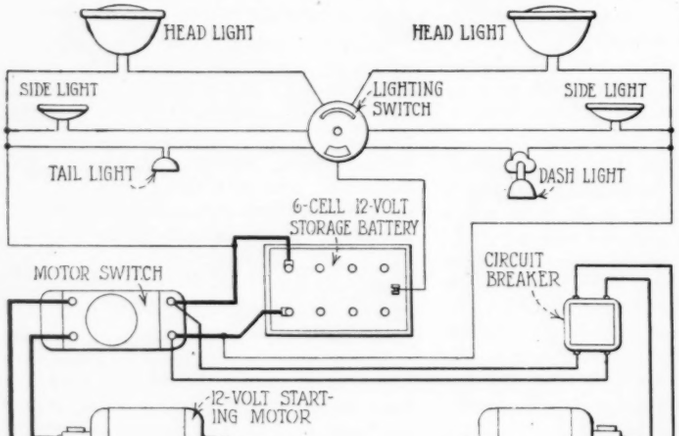


Fig. 734—Wiring diagram of the Leece-Neville installation on 1913 and 1914 cars

THE generator for the 1913 Leece-Neville systems is bipolar, and for the 1914 systems it is multipolar. It is connected to the engine by gears and delivers current to the storage battery at a pressure of 12 volts. The circuit between the generator and battery is closed and opened by a special two-pole cutout, which also serves as a visual battery indicator as to whether the battery is being charged or not. The output of some of the generators is regulated by armature reaction. They are shunt-wound machines, and a maximum current of approximately 12 amperes is reached at a speed of about 15 m.p.h. In some cases the generators are provided with both a shunt and series field winding, and in each case the magnetizing action of the series field opposes that of the shunt field and thus tends to prevent an excessive rise in the output of the generator as the speed increases.

The starting motors used in 1913 were bipolar, and those used in 1914 were multipolar. The motors are connected to the engine through reducing gears arranged to mesh with gears on the flywheel of the engine. The starting switch has four terminals and may be of the rotating-drum or sliding-contact type. The same rod that throws the motor gears with mesh transmits the necessary motion to the starting switch. The rod itself on some cars is operated by moving the transmission gearshift lever into a

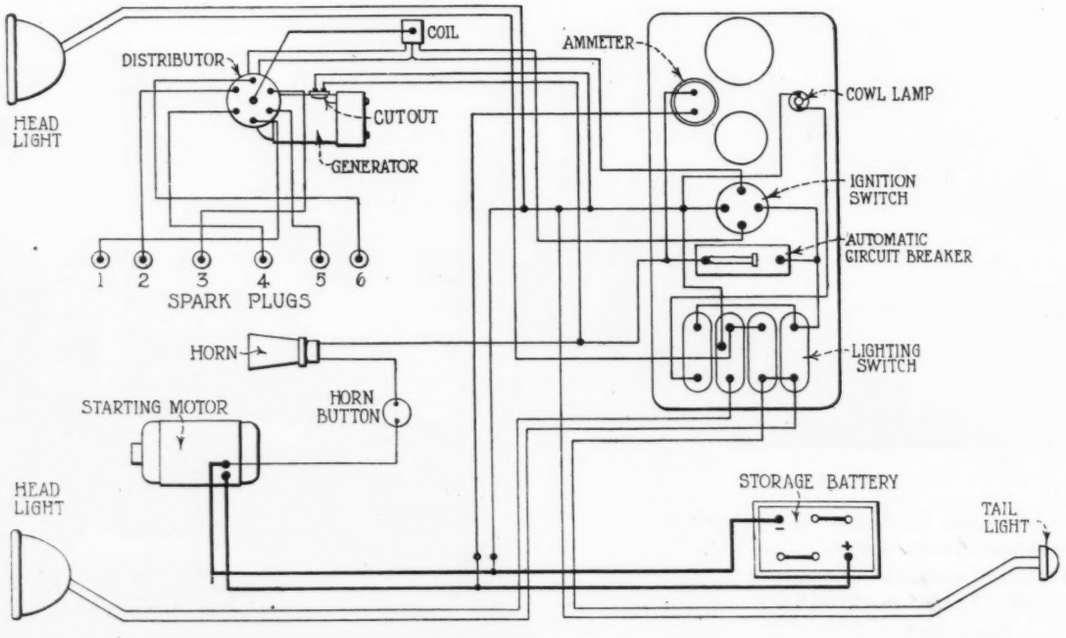


Fig. 735—Wiring diagram for Neece-Neville starting, lighting and ignition on 1915 Haynes light six

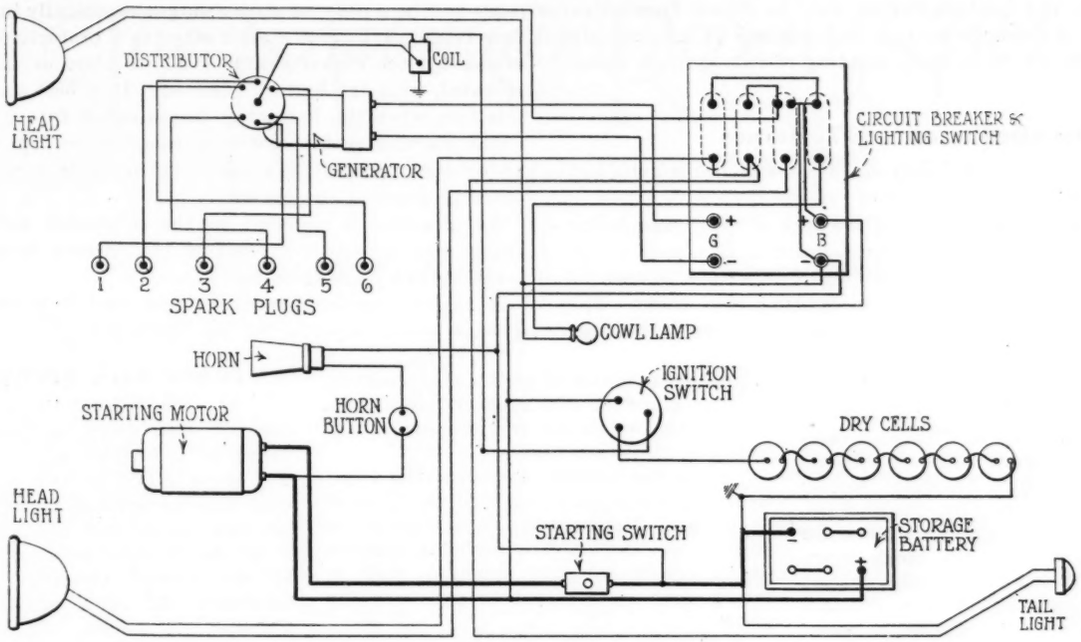


Fig. 737—Leece-Neville installation on the 1917 Haynes light six

special slot and then pushing it forward quickly to the end of the slot. A spring throws the gears out of mesh when the lever is returned to its neutral position and the starting switch is opened. On cars equipped with magnetic gearshifts, the rod which operates the intermediate gears and the starting switch itself is operated by the starting pedal. Pressing a button the dash marked "start" connects the rod to the clutch pedal magnetically, and the gears are thrown into mesh and the starting switch closed by throwing the clutch pedal forward. When the button on the dash is released the gears are thrown out of mesh by a spring and the starting switch is opened.

In the 1913 installations the reduction gears are not incased, while in the 1914 installations the gears are incased in the end yoke of the motor, which makes it possible to keep them well greased.

The wiring of the car is such that the lamps operate on 6 rather than 12 volts. A wiring diagram of the Leece-Neville installations is shown in Fig. 734.

The output of the 6-volt generators for 1915, 1916, 1917 and 1918 is regulated by the third-brush method. They are shunt-wound, and a coil is placed on each of the four poles. In some cases an ignition head is mounted on the generator. Some of the systems make use of a four-terminal two-pole electromagnetic cutout mounted on the dash, while other systems have the cutout mounted on the generator.

The starting motors are four-pole, series-wound. In some installations the motor is connected to the engine by a planetary reduction gearing mounted in the end of the motor frame and a silent chain which drives through an overrunning clutch. Other installations make use of the Bendix drive in connecting the motor to the engine crankshaft.

The starting switch may be of the two-terminal plunger type mounted under the floorboard, or it may be mounted on top of the starting motor and operated by a rod.

Installation on 1915 Haynes

The installation on the 1915 Haynes is a 6-volt, two-unit, two-wire system. A wire diagram of the system is shown in Fig. 734. The output of the generator is regulated by the third-brush method. Rotating the third brush in the direction of rotation increases the current output of the generator at any given speed, while moving the third brush in the opposite direction to the rotation of the armature decreases the output. The generator and storage battery are connected and disconnected by a two-pole cutout which opens both sides of the circuit. No ammeter is used, but a target is mounted on the cutout in such a way that the word "Off" appears through an opening in the front of the instrument when the generator is not charging the battery and the word "Charging" appears when the battery is being charged. This combined indicator and target is mounted on the dash of the car together with the light switches, and a front view of the panel is shown in Fig. 735. Three lighting buttons are provided, and they operate the following circuits: The upper one when it is pulled out turns on the headlights dim with the taillight bright; when the second switch is pulled out, leaving the upper one out, the headlights are turned on bright and the taillight remains bright; the third switch controls the cowllight.

There are two running positions for the ignition switch, so

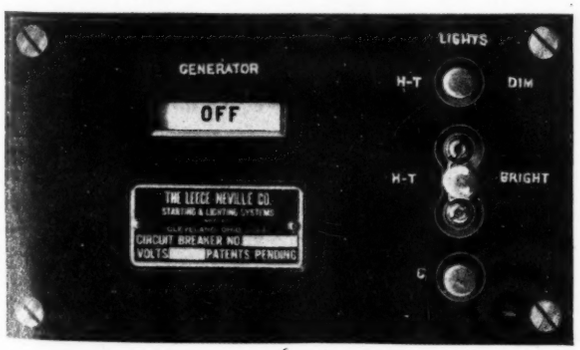


Fig. 736—Leece-Neville cowl panel on 1915 Haynes light six

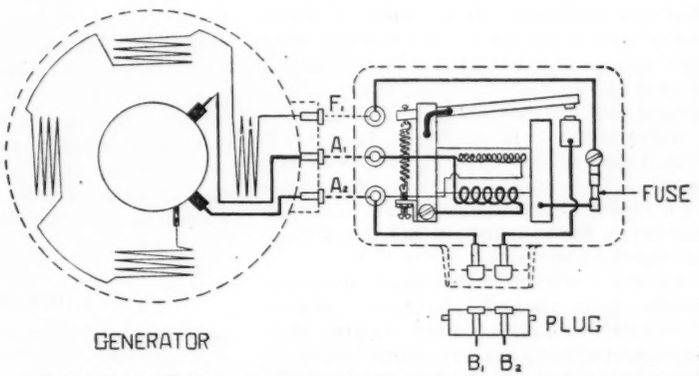


Fig. 738—Wiring diagram of Leece-Neville generator and circuit breaker on 1917 Haynes light six

that current for the ignition system may be drawn from either of two sources, the storage battery or a battery of six dry cells. The negative side of the primary winding of this ignition circuit is grounded.

Installation on 1917 Haynes

The installation on a 1917 Haynes is a 6-volt, three-unit, two-wire installation. A circuit diagram of the system is shown in Fig. 737. The generator and motor are both of the round frame, four-pole type. The output of the generator is regulated by the third-brush method, and it automatically is connected to and disconnected from the battery by an electromagnetic cutout. This cutout is mounted on top of the generator, and connections are made to it by a plug, as shown diagrammatically in Fig. 738. The fuse in the shunt field circuit serve as a protection to the generator should the cutout contacts fail to close or the generator be operated, with the battery removed. It is best always to remove this fuse when the battery is disconnected for any reason at all.

The starting motor switch is mounted on top of the starting motor and operated by a rod which leads to a ring in the cowlboard in front of the driver.

An ammeter is mounted on the cowlboard and indicates the charge and discharge current of the battery except the current taken by the starting motor.

A battery ignition system is used, and it is controlled by an ignition switch mounted on the cowlboard.

DENVER PLOWING EXHIBIT

(*Concluded from page* 18)

and Livestock day, while Thursday was called Rocky Mountain States day.

Several makers were showing two or three different sized tractors on the field, but as a general thing the big outfits did the best work, as they ran much more steadily and were too heavy to be shifted about the inequalities of the ground. Some of the giant outfits pulled so many bottoms that there was very little penetration, which is often the case where a large gang is pulled as the unit is not as flexible as a smaller one and will override depressions. Few of the tractors made a uniform depth of 6 in., but one or two went down as deep as 7 or 8 in. Deep plowing was not asked for from any of the machines. The soil was quite uniform, much heavier than the eastern soil where demonstrations have been held. There was a heavy sod, which in most cases was well turned under where it will for a long time furnish a moisture sponge.

Army Exhibits Also

There was a note of the military in the demonstration, with several huge tanks and other army appliances in the headquarters tent. Several of the French seventy-five field pieces thundered a salute at 1 o'clck Tuesday afternoon, which was the formal opening of the demonstration and the signal for the 100 tractors to drop their plows and start turning the hard-boiled land to a depth of 6 in. Practically every make of tractor was represented, pulling from two bottoms, in the case of the Fordson, to twenty-four bottoms, which the big Avery pulled. In the first minute, nearly 2½ acres of land were plowed, and this record was practically maintained as the time went on. Each day was a repetition of the first, with the exception that the machines had to move to a different field each time. After every vestige of the virgin soil had been turned over and disked the machines swung around and formed a gigantic parade.

Over 1200 acres of the land turned, disked and drilled will be planted to fall crops. The land has been idle since time began and probably would have remained so for years more had it not been for the tractor.

All the tractors at the show were not in the field. Scores of them operated threshers, ensilage cutters, cream separators, in fact, almost every piece of apparatus apt to be used on the modern farm. In addition the headquarters tent contained exhibits of piston ring makers, tractor engines, oils and greases, tractor hitches, steels for tractor parts, magnetos, carbureters, etc.

The demonstration was authorized under national supervision and the Denver Civic and Commercial Association as well as the Denver Tractor Club deserve much credit for the splendid way in which they co-operated to put over the show.

A. E. Hildebrand, manager, and J. B. Bartholomew, president the N. I. V. A., declared that the Denver conditions were ideal and feel that Denver is the logical place for the big national demonstration, not only from the standpoint of soil conditions but hotel accommodations and similar matters that go to make a successful show. The idea seems to be for doing away with the small regional demonstrations and concentrate on the one big show on the Colorado plains.

While some people complained of the terrific dust, the farmers and tractor men declare the dry soil was just what they wanted. With damp soil plowing becomes a relative easy matter, but the Western farmers wanted to know just what the tractors could do on the virgin acreage baked so long that it seemed impenetrable.

WARNS AGAINST UNAUTHORIZED AGENT

Chicago, June 16—The Twin Tube & Rubber Co. has issued a warning that some unauthorized agent has been calling on dealers in Indiana offering them exclusive rights in handling Twin Tube tires on a long discount and at the same time offering to sell them five shares of stock at $10 a share, to be paid at once, with the understanding that the $50 paid for the stock is to apply against the entire order. The company states that it is not offering any of its stock to the public and has only one man in the territory where the unauthorized agent has been operating. The authorized representative of the company in that territory is F. F. Hodges. It is believed that the unauthorized man is using the name F. P. Steiner or Victor Brunn or B. Brunn, according to the Twin Tube & Rubber Co.

CORRECTION

Daily production at the Moore factory is fifteen cars with sixty-five cars a week and not, as stated in last week's description of this car, 300.

THREE RACE RECORDS FALL

(*Concluded from page* 17)

did not slow down on this account but drove at a furious pace until his right tire went down in the last lap. Even with this he finished in 16:20.4. De Palma was second and Boyer, third.

In the 10-mile event staged in place of the special 20-mile race for local amateurs six cars started: Mulford, Thomas, de Palma, Milton, Lewis and Boyer. The cars maintained the same positions throughout the race that they had at the end of the first lap, except Milton, who retired after one lap. Mulford won. Boyer and de Palma were second and third respectively.

BAKER TO DISTRIBUTE CLETRAC

Cleveland, Ohio, June 16—The Cleveland Tractor Co. has made new arrangements for distribution of its tractor, the Cletrac, in North Dakota, which formerly was handled in that territory from Minneapolis. The Baker Tractor Co. has been formed with Julius R. Baker as manager, and this concern will take over the distribution for North Dakota and the adjoining counties in Minnesota. Headquarters will be in Fargo.

$1,300,000 GARAGE PLANNED

Cleveland, Ohio, June 14—The Ninth Garage Co. has been organized here to build and operate a $1,300,000 garage, containing approximately 250,000 sq. ft. of floor space and capable of housing 2000 cars. The officers are: President, W. A. Fay; vice-president, J. H. Fuller; secretary and treasurer, Thomas Nolan.

A four-story concrete structure will be built. Its foundations will be so made as to permit the construction of an additional four stories later. All floors will be available to owners through a system of easy inclines. It will include all departments, laundry space, repair rooms, retiring quarters and other divisions.

SHELDON ENTERTAINS AT PLANT

Wilkes-Barre, Pa., June 14—The Penna section of the S. A. E. held its annual outing here to-day as guests of the Sheldon Axle & Spring Co. More than sixty members of the section were on hand early for the day's outing and after breakfast were taken out to the Sheldon plant, where the balance of the morning was spent in inspecting the different shops and departments of that company.

The Motor Car Repair Shop

Practical Maintenance Hints

Important to Keep Brakes Working Evenly

IT is of fundamental importance to keep the two brakes working evenly. Some cars are equipped with an equalizing device which tends to maintain an even strain on the two brake drums, and these are the hardest to remedy when the rubbing surfaces grip unevenly. For instance, one drum or lining may become filled with mud, causing rust on the drum and an extra wearing tendency on the part of the fabric. Or on the other hand, the lining may become impregnated with oil, causing more wear on the normal brake drum than on the one greased. In either case, if the situation is bad, it will be necessary to remove the wheel and clear both lining and metal surface. This usually remedies the fault of this method.

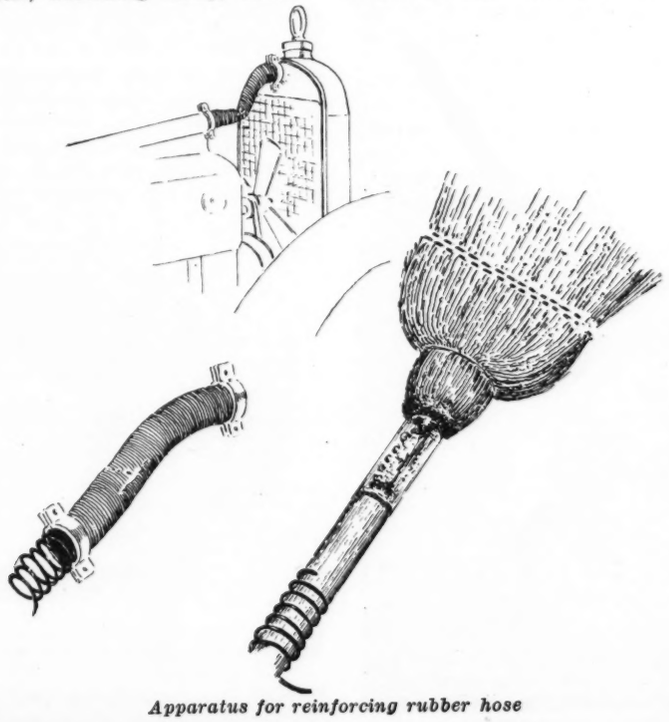
Most cars, however, are equipped with individual connections to the brake pedal from the drum and are adjusted separately. If these grip unevenly, one tire is bound to get the more strain, which in time will wear that tire down sooner than the other one. Sometimes it is very noticeable. When the brakes are applied suddenly, one wheel slides, while the other revolves, perhaps causing the car to swerve slightly. There is no excuse for brakes in this condition. If the owner cannot adjust them himself, he should see that they are attended to.

At other times, the brakes have been adjusted evenly and wear unevenly, so that in time one does not grip as it should, or one, becoming damp, causes rust and in this way creates enough extra friction on the drum to wear it down faster than the other one.

Holding tire case open for inspection

The brakes should be examined from time to time, and these differences noted. The best way to adjust the brakes on the car is to jack up the hind wheels, and with the brake slightly on and the engine running at slow speed with the clutch in, preferably in intermediate speed, any differences in the speed of the hind wheels at once will tell the differences in the grip of the brakes. If one wheel is turning much slower than the other, the brake on that side needs loosening.

It may even be that with the weight and load off the rear wheels in this manner, one wheel may not revolve at all while the other is revolving at twice the normal speed. Such an example only shows how much extra force is applied to the one wheel than the other.



Apparatus for reinforcing rubber hose

Preventing Kinks

On one occasion, excess heating of an engine finally was traced to a kink in the rubber hose leading to the radiator. It had become heated several times and weakened the walls, so that in making a rather sharp curve it collapsed, partially shutting off the flow.

This was remedied permanently by removing the hose and inserting a coil spring made of rather stiff wire, wrapped about a broom handle. When freed this spring was slightly larger than the inside diameter of the hose but was inserted by turning the spring in the direction that the wire was wrapped when it was made, in the meantime, being forced in. This straightened the kink, and it has not bothered since.

This method of reinforcing and strengthening various sizes and kinds of rubber hose and tubing also works well in all sorts of instances. In making sharp turns and bends, tubing for gas lights tend to collapse, and they can be remedied effectively by this method.

Tire Casing Examination

The examination of the interior of a tire casing is facilitated by the use of the apparatus shown. The weight of the tire is supported on two rollers countersunk in the surface of the bench. Two other rollers are used to hold the tire casing open. One is mounted at a suitable height on a wall bracket and the other is carried on a rod whose far end is hooked so that it may be slipped into any one of a series of holes, thus providing for the necessary adjustment required for tires of different sizes.

Slipping Belts

If you are troubled with a belt that habitually seems too loose try propping up the ceiling or rafters to which the countershaft is bolted. Sometimes, especially if the building is a one story affair, the roof or ceiling sags and naturally the countershaft sags also, producing a loose belt. This has fooled many garagemen.

The Readers' Clearing House

Questions and Answers

Conducted by B. M. Ikert

Miscellaneous

Adjusting Mercer Clutch

Q—Give adjustment of clutch on a Mercer 35D.—William Mayette, Jr., Plattsburg, N. Y.

Referring to Fig. 1, the adjustment on the Mercer clutch is shown by the arrows. Tightening these nuts will move the collar up against the plates and thus take up the wear. These nuts should be screwed up the same amount, as the plates will bear on one side only if this precaution is not observed.

Lowering Steering Wheel

Q—Instruct how to lower the steering wheel on a 1914 Studebaker four.—E. F. Wheat, St. Louis, Mo.

To lower the steering gear proceed as follows: Referring to Fig. 3, loosen the nut I and the securing hanger which is attached to the steering gear at F. Then loosen the nuts B and slide the steering collar up. The whole steering mechanism can be turned about its center, allowing the drag length arm H to turn upon the shaft A. When this is lowered to the desired position the nut I should be tightened, as well as the clamp which secures the gear to the car frame. Now the steering column can be lined up with the new position of the worm shaft and fastened to the dash by wedged-shaped hardwood blocks illustrated in MOTOR AGE of June 12.

Adjustments for Flanders 20

Q—Publish a diagram of the adjustment of the Flanders 20 transmission.

2—Publish a diagram of the Zephyr carbureter and explain the adjustments. I have a Flanders engine equipped with a Breeze Zephyr carbureter and Atwater Kent ignition and cannot throttle the engine down successfully.

3—Give suggestion for rebuilding a Flanders 20 into a speedster.

4—Could a Ford ring gear and drive pinion be used in a Flanders transmission?

5—What causes the drive pinion and ring gear to strip in the Flanders transmission?—Reader, Hutchinson, Minn.

1—The transmission of the Flanders 20 is illustrated in Fig. 2. The only adjustments on this transmission are those that are secured with the small bolts A. These move the countershaft of the transmission one way or the other, allowing the gears to mesh properly.

2—The Zephyr carbureter used on the Flanders is illustrated in Fig. 4. To adjust this carbureter see that the dash control is down, the engine warm and spark retarted. Turn the wing nut W on top of the carbureter to the left, thereby decreasing the tension on the air valve. Make the tension just enough to seat the valve and no more. The fuel adjustment screw at F should be unscrewed about three turns. This gives an approximate position only. The correct position is secured by turning one way or the other until the engine idles smoothly without missing.

When this adjustment is completed the high-speed valve should be regulated. Advance the spark lever about half way and then rapidly accelerate the engine. If the engine backfires while it is picking up, it is a sign that the mixture is rather lean at high speed. To overcome this decrease the tension on the air valve. If the engine does not backfire, the air valve should be turned until it does. As soon as this misfiring condition is determined, then the motion of the air valve should be reversed until the point is reached where misfiring ceases.

3—Your Flanders 20 car is probably of 1910 or 1911 origin. We do not advise you to attempt to change this car into a speedster, because the attempt will be unsuccessful. The carbureter on your car is of an old type and will not successfully handle present-day fuel. Great strides have been made in gas engine design since your car was designed, so we really believe it would be better for you to sell it and invest the money in a newer model.

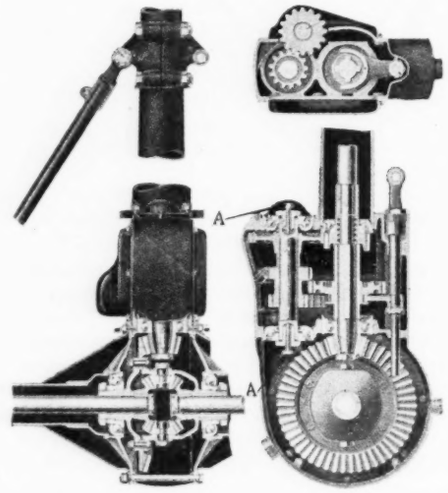


Fig. 2—Transmission on Flanders 20, showing adjustments

Case-Hardening Tools

Q—How can I case-harden cutting tools?—Steve Kutilla, New Orleans, La.

The outer surface of the tools made of soft steel may be made hard by using the following case-hardening process: First, a hardening compound must be made. To do this mix nine and a half parts of fine charcoal with 2½ lb. of table salt. Place 2½ lb. of kerosene oil in a dish,

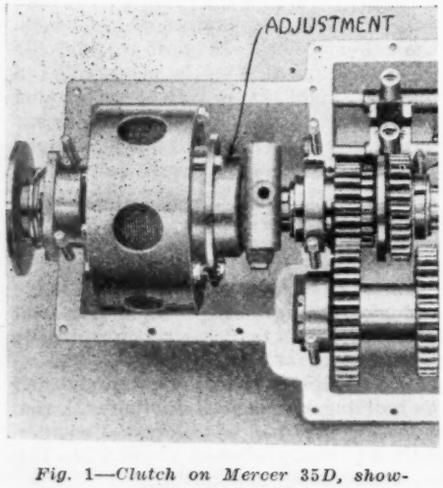


Fig. 1—Clutch on Mercer 35D, showing adjustments

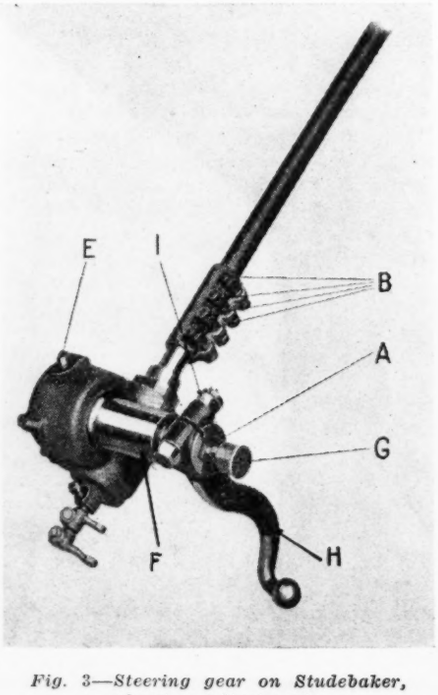


Fig. 3—Steering gear on Studebaker, showing adjustments

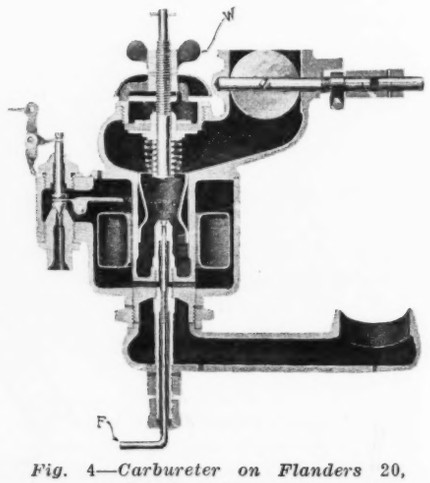


Fig. 4—Carbureter on Flanders 20, showing adjustments

and put with it as much sawdust as is required to soak the kerosene up. Now mix the sawdust and oil with the charcoal and salt. Making the crucible is the next step. Secure a piece of iron pipe long enough and large enough to hold several tools at the same time. Place the tools in this pipe, and pack around them the hardening compound. Care must be taken to see that the tools do not touch the pipe or one another. Both ends of the iron pipe should be closed with fire clay. Now place the pipe in a large forge and heat slowly to a bright red heat, about 200 deg. The time during which the pipe should be kept at a bright red heat varies with the size of the tool and the amount of case-hardening desired. Ordinarily 2 hr. at a bright red heat is sufficient to give 1/16-in. case.

Tubing for Socket Wrenches

Q—What size of steel tubing should be used to make socket wrenches for ¼, 5/16, ⅜, ½, ⅝ and ¾-in. nuts?—John Smith, Ashtabula, Ohio.

Proper size of steel tubing necessary to make socket wrenches for ¼, 5/16, ⅜, ½, ⅝ and ¾ in. nuts is respectively .275, .345, .422, .550, .687 and .826. These are theoretical inside diameters. In practice you will not be able to secure tubing of these sizes, but the closest commercial size will do.

Details of Kulick's Ford

Q—Publish photograph of the Ford racer driven by Frank Kulick in 1912 in the Algonquin hillclimbing contest.
2—What was his time?
3—Did he hold the world's record at that time on that hillclimb?
4—Was it a standard Ford engine?—Claude Vance, Chicago.

1—This is shown in Fig. 5.

2—Kulick's time for the 301-450 cu. in., under 600 cu. in. and the free-for-all race respectively was as follows:

Morning hill	Afternoon hill
17 3-5 sec.	31 4-5 sec.
15 2-5 sec.	27 1-5 sec.
15 4-5 sec.	28 2-5 sec.

3—Yes. Kulick broke the record for both hills.

4—His engine was a special job, having a bore of 4⅞ in. and stroke of 5½ in.

Gage Records Incorrectly

Q—I have taken an old spark plug and fitted a valve from an inner tube in it by soldering and making it gas tight. I figured that this could be used to tell compression in each cylinder. I tried this on a 1919 Dodge Brothers car and found a pressure of 30 lb. in each of the four cylinders. This pressure was taken by a tire gage. I found out from the Dodge that the pressure should be 65 lb. in each cylinder. Why did not my instrument register this amount, as the engine seems to be in good order and is able to make 55 m.p.h.?
2—What speed should a Dodge Brothers touring car make on a good paved road?
3—Why are some spark plugs made with an extension at the top and some at the bottom?
4—Would it not be more advisable when cleaning carbon with carbon remover to disconnect the suction tube from the vacuum tank and attach a hose and suck the remover into the engine this way with the starter, with the spark off? Would this not spray the whole engine and clean much better than when put in the spark plug openings?
5—Would you recommend any of the moisteners on the market?—G. C. Adams, Pittsburgh, Pa.

1—Since your car operates as well as it does, we are led to believe your home-made tire gage does not indicate correctly. The spring on a tire gage is very stiff and indicates after a considerable period of time, but when applied to the rapidly rising pressure within the combustion chamber, we believe the tire gage will not be responsive enough. If the engine is turned over very slowly to meet this defect, the leakage of air through the gage and its connection will give a false indication.

2—If your car does 55 m.p.h., you are getting all the speed from it you can expect.

3—The ordinary extension spark plug is made to be fitted in oil-fouling cylinders. These extension plugs, because of the large amount of exposed metal, become extremely hot and thereby help to overcome the spark plug fouling difficulty.

4—No, we do not think your suggested method of introducing carbon remover compound to the cylinder is as good as the old and tried method of removing the plugs and pouring the liquid in. Disconnecting the suction pipe from the vacuum tank no doubt will cause it to leak but spark plugs with good-fitting gaskets do not leak after they have been removed several times. Spraying the carbon remover into the cylinder might distribute the material a little better, but it will be added in a mist form only. It is the actual contact of the liquid with the carbon that helps its removal and we believe the compound will work much better in liquid form.

5—See answer to C. H. Grimm, Beech Glen, Wheeling, W. Va.

TO assist readers in obtaining as a unit all information on a certain subject MOTOR AGE segregates inquiries in this department into divisions of allied nature. Questions pertaining to engines are answered under that head and so on.

MISCELLANEOUS

W. Mayette, Jr.....Plattsburg, N. Y.
E. F. Wheat.....St. Louis, Mo.
Reader.....Hutchinson, Minn.
Steve Kutilla.....New Orleans, La
John Smith.....Ashtabula, Ohio
Claude Vance.....Chicago
G. C. Adams.....Pittsburgh, Pa.

THE ELECTRIC SYSTEM

Reader.....Dillon, Mont.
Glen E. Hamilton..Grove City, Ohio
Rudolph Kramer....Cheyenne, N. D.
R. M. Berger.....Chicago
Archie F. Bloom.....Axtell, Neb.
W. E. Throgmorton.....
.....Little Rock, Ark.
Frank H. Savage...Gamesville, Tex.
Lloyd Watters.....Neilsville, Wis.
Paul Kientsch..San Francisco, Cal.

LUBRICATION

Archie F. Bloom.....Axtell, Neb.
F. J. Norrisk.....Detroit
R. Smith.....Horton, Kan.

ENGINES

Junius S. Wade....Augusta, Ark.
Steve Kutilla.....New Orleans, La.
William Rhys.....Scranton, Pa.
W. J. Rapp.....San Jose, Ill.
Alfred Johnson.....Chicago
R. E. Kahla.....Winnie, Tex.
George D. Morris....Cleveland, Ohio

CARBURETION

F. J. Norrisk.....Dtroit
R. L. Mangnall.....LaSalle, Ill.
R. M. Pierson.....Akron, Ohio
C. H. Grimm.....Wheeling, W. Va.

REBUILDING

C. W. Bohn.....Bismarck, N. D.
J. E. Reynolds....Los Angeles, Cal.
J. D. Droke.....Tunica, Miss.
William Klakr...New Haven, Conn.
Schuyler Spurrier..Okmulgee, Okla.
William A. Mehl.....Towson, Md.
G. F. Hausen.....Portland, Ore.
Steve Kutilla.....New Orleans, La.
N. Batinovich.....Aberdeen, Wash.

No communications without the writer's name and address will be answered in these columns.

The Electric System

Reader Suggests Installation

Dillon, Mont., Editor MOTOR AGE—I note in two of your issues inquiries regarding the installation of Kemce lighting generators and as I have installed one on a Ford I thought my method of installation might be of interest.

To begin with I removed the V-type pulley they originally are equipped with. Then I sawed off a pulley from an old Ford fan. I put both the pulley and generator in a lathe, cutting out the pulley and cutting down the generator to a close fit, then pressed the pulley on the generator. Then I installed it on the car with its bracket and used the regular Ford fan belt.

The generator is the two-wire type. I bought the type of cut-out used on the 1915 Studebaker, grounded the negative side of the generator and ran the positive lead to the cut-out. I fastened the cut-out to the fourth engine bolt on steering gear side of the engine. From the battery side of cut-out I ran straight to the positive side of the battery, then grounded the negative side of the battery on the driver's side fender as far front as possible. I then tapped off a lead even with the dash, ran straight across dash to light switch, thence to right front head-

Fig. 5—Frank Kulick in the Ford racer he drove in 1912

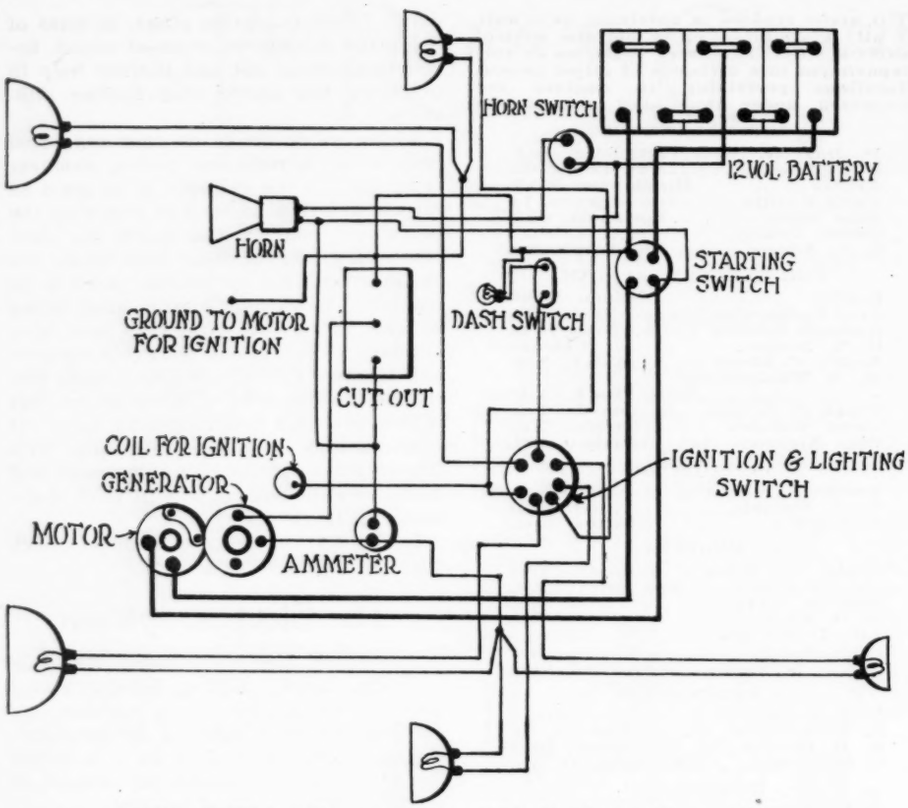


Fig. 6—Wiring diagram of the 1914 American with ammeter

light, then to left front headlight, running wire under crankcase so it would not be disturbed in case I had to remove radiator. I tapped off this feed wire for the lamp with No. 18 drop cord, drilling ¼-in. hole through the frame for the lamp wires, grounding one side on outside frame of car. I tapped off of headlight wire on right of switch for taillight and grounded other side. From generator side of cut-out I ran a wire to a voltmeter on dash, grounded other side to steering gear.

At 18 miles I get 7½ volts. Speeding up the engine will not increase the voltage over 7½, as the belt will slip. Therefore, you do not need a regulator. I have used this installation since last August, and it worked fine. I have put on one new belt. I use a 40-amp. hr. lighting battery.—Reader.

American Wiring Diagram

Q—Publish wiring diagram of 1914 American Six underslung, using type D Electro starter. This system is not equipped with an ammeter but has a Roller-Smith indicator showing charge or discharge. The way it is wired now it only shows the charge.

2—Show in the diagram how it should be wired to show the discharge.—Glen E. Hamilton, Grove City, Ohio.

1—This diagram is shown in Fig. 6.

2—The ammeter connection is shown in the illustration.

Storage Batteries Wear Out

Q—The storage batteries which we repaired last winter have entirely played out after only a few days' use and we are at a loss to account for the trouble. These batteries were slow to pick up and would not take on a full charge, that is, the gravity test did not come up higher than about 1200. We took them apart and put in new separators in one and new separators and positive plates in the other. They were put on charge in distilled water at 5 amp. for 12 hr. The water was drained off and 1300 electrolyte put in and again put on a 5 amp. charge for four or five days. The batteries came up in fine shape but after being put in service would only start the car a few times. In taking the batteries apart again it was found that the positive plates were a mass of loose pulp and dropped to pieces, and it was found that the grid in the plates had been entirely eaten away so that the plates could be removed in perfect shape but there were only grooves where the grid had been. The separators were not discolored but were more brittle and pulpy.—Rudolph Kramer, Sheyenne, N. D.

There are two possible diagnoses of this case. The first one is that the battery might possibly have been frozen slightly but not enough to show the material loosened from the positive plates at the time the battery was taken apart. A condition of this kind would really not show up until after the battery had been re-insulated and given a re-forming charge. The action of the re-forming charge would have tendency to loosen the active material in the positive plates and cause it to shed very rapidly.

The second solution is that this battery might have been quite old at the time it was taken apart and re-insulated. It might have seen so much action that the grids of the positive plates have become sort of crystallized. While this might not have shown up at the time the battery was opened, it would develop very rapidly after the battery had been re-insulated and re-assembled. The action of the current during the developing charge very easily might have caused these plates to crack and to crumble to pieces.

Wiring of 1913 Keeton

Q—Publish the lighting and generating system of a 1913 Croxton-Keeton. Can an ammeter be used?—R. M. Berger, Chicago.

This is shown in Fig. 7. Owing to the layout of this system, it is impossible to connect an ammeter in the circuit.

Spotlight on Hupmobile

Q—In connecting a spotlight on a series R Hupmobile should it be connected to the horn wire or to the battery terminal? If it is connected to the horn or headlight wire, would there be more chance of burning out either of these fuses when the spotlight is on? It has a 36-cp. nitro bulb, 4 amp.—Archie F. Bloom, Axtell, Neb.

It would be perfectly satisfactory to connect the spotlight to the horn wire. It is always advisable to protect a spotlight circuit with a fuse. The spotlight wire being continually exposed and subject to movement one way or the other, it is very apt to become short-circuited, and unless this is protected with a fuse it is very apt to injure the battery. If you find that the horn fuse burns out with the spot attached, secure a fuse with an increased capacity.

Battery Charging

Q—What is the correct pronunciation of the word "hydrometer" and "speedometer"?

2—Do all battery charging stations have a standard rate of charge for all makes of batteries of from four to six amp.?

3—To what specific gravity do they as a general rule raise the batteries to 1.260 to 1.280 or 1.280 to 1.300?

4—If a battery is kept at a gravity of 1.300 all the time or every time it is charged it is raised to this point, will it shorten the life of the battery?—W. E. Throgmorton, Little Rock, Ark.

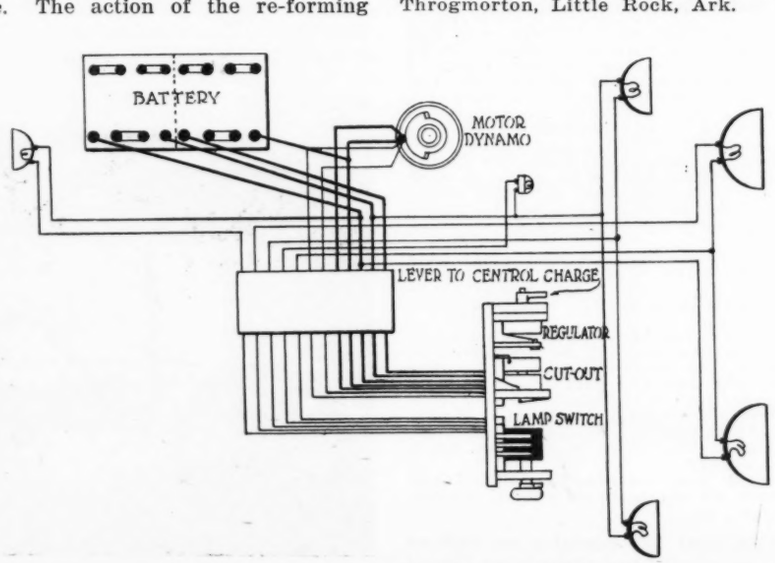


Fig. 7—Wiring diagram of the 1913 Croxton-Keeton car

1—See any standard dictionary for explanation.

2—The rate of charge of a storage battery varies and is dependent upon the condition of the battery. Ordinarily when the battery is in an exhausted condition the charge will begin at 10 amp. and will finish at about 2 amp.

3—The correct specific gravity for a fully charged battery is 1.280 or 1.300. A new battery will come up to 1.300, while an older one generally does not get much above 1.280.

4—Keeping a battery up to its full charge will not injure it but on the contrary will lengthen its life. Care must be exercised though to see that the cells are kept well filled with distilled water.

Rheostat and Condenser

Q—What is a rheostat?
2—What is a condenser?—Lloyd Watters, Neilsville, Wis.

1—A rheostat is a device that offers a resistance to flow of electricity.

2—A condenser, as for electrical apparatus, properly might be called a storehouse. It absorbs electrical energy when the voltage wave is at its maximum and allows it to be discharged when the motor drops below the normal amount. When applied to an alternating current circuit a condenser apparently will transmit power, but when applied to a direct current circuit this is not so. In the latter case the flow of current into the condenser is momentary, flowing into the condenser until it is filled up. If there is no reversal of the current, then there will be no further displacement in the condenser, but if there is an interruption in the circuit, such as would be caused by the opening of the breaker points, then the excess voltage which is induced because of the sudden breaking of the circuit does not tend to make a spark but flows into the condenser. Then as soon as the points are closed the condenser discharges this excess current.

Jesco System on Cutting

Q—Publish wiring diagram for model 40B Cutting 1913 five-passenger car. It has Jesco starter and Remy low-tension magneto.
2—Instruct how to connect ammeter.
3—Can I use the same coil that comes with the car with a high-tension magneto?
4—The relay is not working good. Where can I get a relay to replace the old one?
5—Can I use a late model Marvel carbureter as used on Buicks? If not, where can I get one that will be suitable?— Frank H. Savage, Gamesville, Tex.

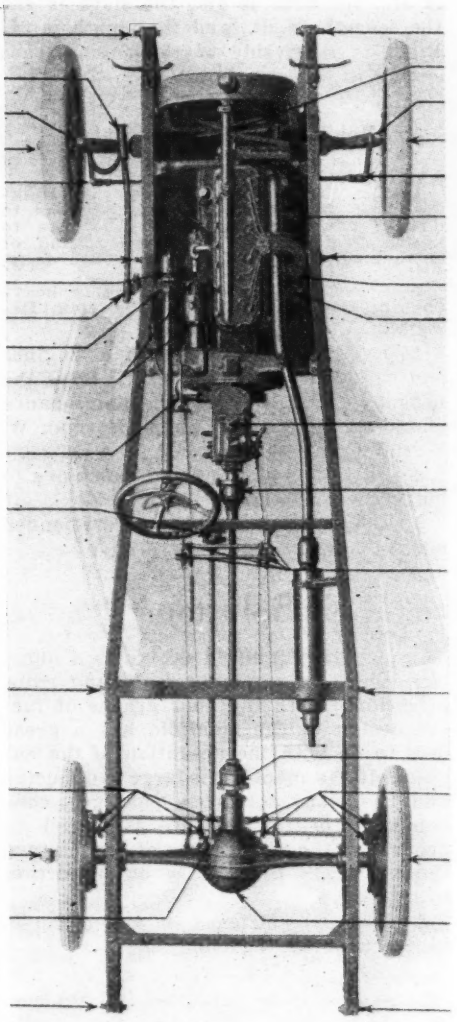


Fig. 9—Oiling chart of the Abbott-Detroit car

1—See Fig. 8.

2—The illustration shows the position for the ammeter connection. The wires leading to the instrument can be of sufficient length to reach any convenient place on the instrument board.

3—Yes, if a dual system magneto is used, the diagram for which was given.

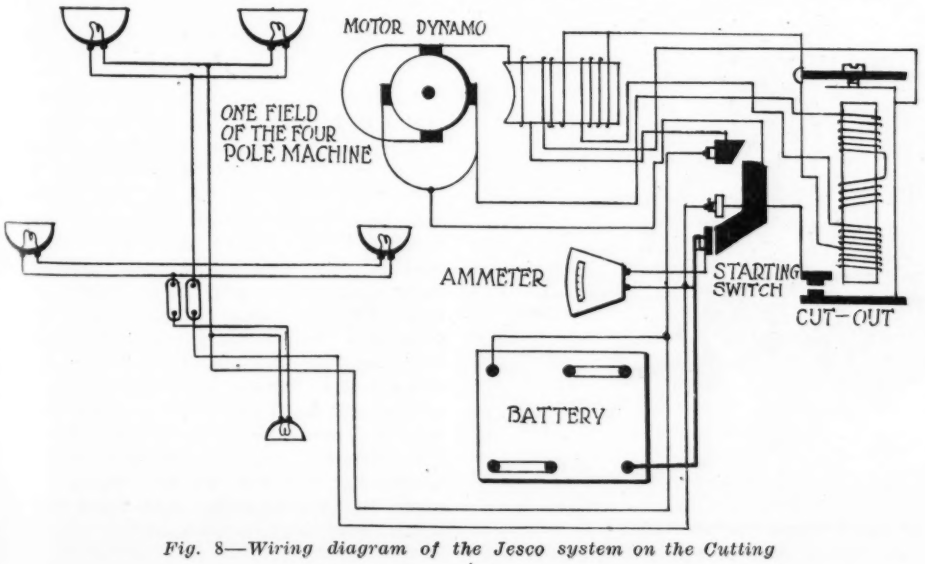


Fig. 8—Wiring diagram of the Jesco system on the Cutting

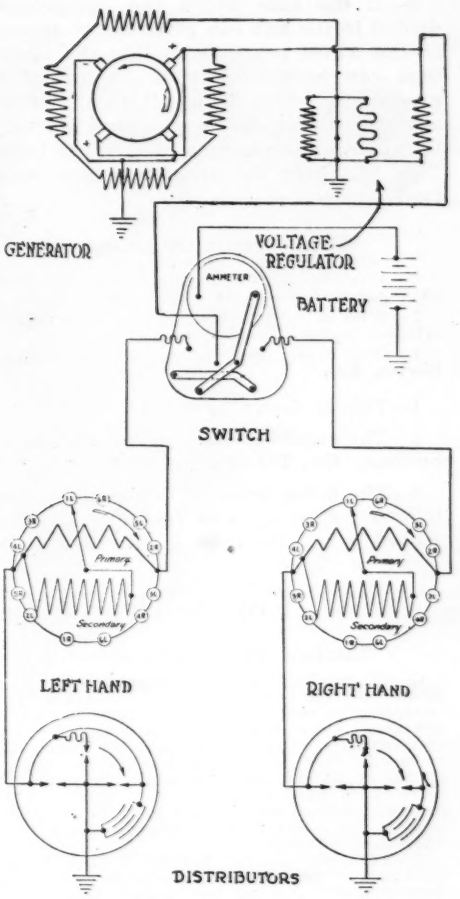


Fig. 10—Wiring diagram of the Liberty engine

This is not a high-tension system though.

4—See the Remy service and parts men in Dallas or San Antonio.

5—Some special fitments will be necessary for this carbureter installation, and we advise that you write the Marvel Carbureter Co., Flint, Mich.

Wiring of Liberty Engine

Q—Publish wiring diagram of the starting, lighting and ignition system used on Liberty airplane engines and its operation.
2—Publish several addresses of the largest tool manufacturers in the United States.—Paul Kientsch, San Francisco, Cal.

1—The wiring and ignition system of the Liberty airplane engine is shown in Fig. 10.

Several of the largest machine and tool manufacturers listed are: Niles-Bement-Pond Co., 111 Broadway, New York, N. Y.; Cincinnati Milling Machine Co., Cincinnati, Ohio; Brown & Sharpe Mfg. Co., Providence, R. I.; L. S. Starrett Co., Athol, Mass.

Lubrication

Lubricating Hupmobile Wheels

Q—How are the rear wheel bearings lubricated on the series R Hupmobile?
2—A garageman drilled a small hole through the wheel hub so that the bearing could be lubricated through the hub cap. Do you believe this is satisfactory or would it be better to pull the wheels each time they are lubricated?—Archie F. Bloom, Axtell, Neb.

1—Hupmobile advises that the rear wheel bearings be cleaned and repacked with grease every 2500 miles.

2—If the hole which the garageman drilled in the hub cap gives direct access to the wheel bearings so that the bearings can be packed with the aid of a grease gun, then it is all right. It is advisable to tap the metal where the hole is drilled and then fit a plug to the hole. This will keep the oil and grease from running out.

Oiling System on Abbott

Q—Publish diagram of oiling system on the 1916 Abbott-Detroit car, model 880.

2—Who is the manufacturer of this eight-cylinder engine?

3—Give firing order of engine.—R. Smith, Horton, Kan.

1—This is shown in Fig. 9.

2—The engine is made by the Hershell-Spillman Co., Tonawanda, N. Y.

3—The firing order of this engine is as follows: First cylinder to fire is 1R., the second is 1L., the third is 3R., the fourth is 3L., the fifth is 4R., the sixth is 4L., the seventh is 2R., and the eighth is 2L. Right is right side of the engine when sitting at wheel.

Mobile Oil A for Studebaker

Q—What book will help me take care of a car? Is Dyke's a good book?

2—The oil comes out between the crankcase and the cylinder block. I expect to put in new gaskets and would like to know if shellac or some other kind of cement should be used on a 1918 four-cylinder Studebaker.

3—I use Mobile A oil. Is this heavy enough for summer?—F. J. Norrisk, Detroit.

1—Dyke's book on gasoline engines and cars is a very good book. So is the book by Victor W. Page on maintenance and repair, published by the Norman W. Henley Co., New York.

2—Shellac is a very good substance to make a gasket tight.

3—Mobile oil A is of the recommended consistency for your car.

Engine Problems and Their Solution

Manifold Theory Discussion

Q—If the intake manifold or any passage from the carbureter to the combustion chamber be restricted the trouble of "wire drawing," the change is introduced, and consequently the volumetric efficiency is reduced. Yet if the passages are made large, in excess, the incoming air will not have sufficient velocity to vaporize the mixture, hence also a loss of power. Just how is the compromise between these two extremes effected?

2—To heat the air before it enters the carbureter reduces its volume per unit displacement and as the actual volume of the charge drawn in on the intake stroke is less, naturally the power output is lowered. Yet is not the thermal efficiency lowered through the absorption of heat from the cylinder walls and combustion chamber by the cool incoming charge of unheated gases?

3—Which of these is the greater evil? I understand that the reason for preheating the air is to more thoroughly vaporize the so called "gasoline" with which we must contend, but in so doing are we not sacrificing something?—Junius S. Wade, Augusta, Ark.

1—You have very aptly described the conditions that must exist in the intake manifold of the engine. The happy medium which designers hit upon as being the best produces a volumetric efficiency in the average engine of less than 60 per cent. Manifold design is a question which is receiving more and more attention. With the poor grades of fuel the design of the manifold has a great deal to do with the operation of the engine. If the manifold is large in diameter and has many torturous passages, condensation of the mixture is bound to occur, and the liquid parts of the mixture therefore will flow to the outer portion of the curve.

2—Thermal efficiency of an engine is represented by the equation,

$$\frac{T_1 - T_2}{T_1}$$

where T_1 represents the maximum temperature and T_2 represents the exhaust temperature. The maximum temperature of the engine is effected by several things, each occurring in their respective order, first, the temperature of the incoming gas; second, the temperature of walls of the combustion chamber. If there is a marked temperature difference between the incoming gas and cylinder walls, then the cool cylinder wall affect the temperature of the gas at the completion of the compression stroke. All these things are reflected in the maximum temperature during the burning. If the incoming gas is heated to a degree comparable to the super-heat temperature implied in steam engines, it is very easy to see that there will be a considerable loss of power, even though the mixture be carbureted almost perfectly. Many people equip their cars in summer with a regular intake manifold and in winter change to a manifold similar to the Wilmo.

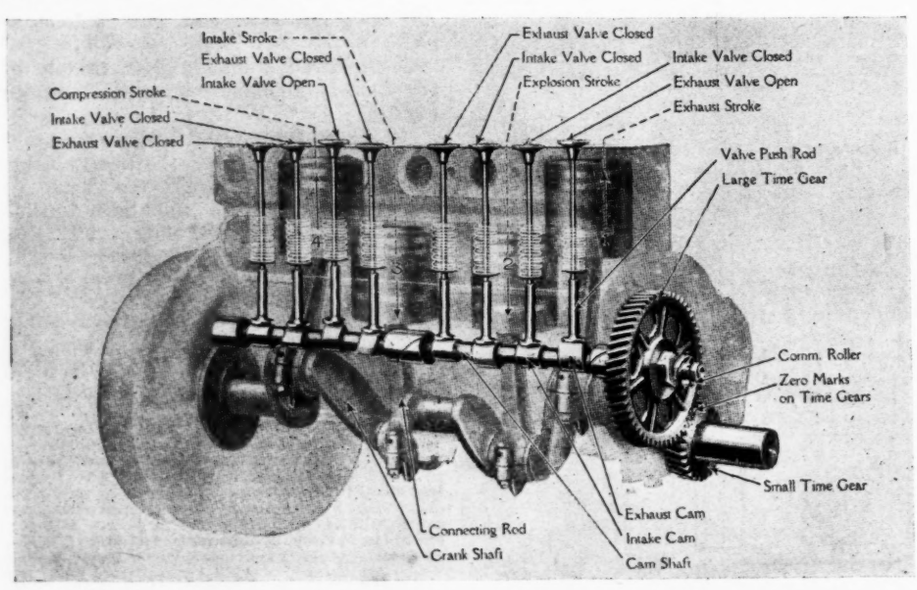


Fig. 11—Valve timing layout of the Fordson tractor engine

Timing Ford Engine

Q—What is the stroke and piston displacement of the Ford engine?

2—State the easiest manner in which to time Ford engine.—Steve Kutilla, New Orleans, La.

1—The bore of a Ford engine is 4 in. and the piston displacement is 176.4 cu. in.

2—To set the time of spark occurrence on a Ford engine place piston of cylinder No. 1 1/8 in. down from top dead center after compression and then set the roller on the commutator so that it just starts to make contact for No. 1 cylinder. The correct timing of the valves on a Ford engine occurs when the piston has traveled 1/16 in. down after the top center. At this position the intake valve begins to open. The intake valve closes when the piston is 9/16 in. after bottom dead center on the up stroke. The exhaust valve opens 5/16 in. before bottom dead center and closes on top center. This timing can be secured by meshing the gear on the crankshaft with the camshaft gear so the mark on the tooth of the crankshaft gear fits into the marked space of the camshaft gear.

Hispano-Suiza Engine

Q—Describe the Hispano-Suiza airplane engine, giving size of engine, bore and stroke, number of cylinders, horsepower developed, position of valves. Is it a top valve? Give illustration.

2—Is the Knight sleeve-valve engine more expensive to make than the ordinary top-valve or L-head engine, size and number of cylinders being equal?

3—Can as high compression be produced in a sleeve-valve engine as in the ordinary top-valve or L-head engine?

4—Is the sleeve-valve engine on an average a longer-lived engine than the poppet-valve engine?

5—Is there any particular reason why the long-stroke engine is not used more generally?

6—Is there a greater strain or stress on the engine when the stroke is long rather than the average of 4 by 4¾-in. stroke?—William Rhys, Scranton, Pa.

1—The Hispano-Suiza engine is illustrated in Fig. 12.

The Hispano-Suiza is of the eight-cylinder V-type and is water-cooled. The bore and stroke is 4¾ by 5⅛ in., and the engine develops 150 hp. at 1450 r.p.m. at sea level. There are two cylinder blocks, each containing four cylinders, their center lines making an angle of 90 deg. The individual cylinders are steel forgings, heat-treated, machined and threaded on the outside. These steel sleeves are flanged at the bottom and closed at the top. This surface being flat, the two valve seats are provided for. The cylinders are screwed into the cast aluminum cylinder blocks, which comprise the waterjackets and valve ports, intake and exhaust passages.

2—The Knight sleeve-valve engine costs more than the ordinary top-valve, or L-head engine, size and number of cylinders being equal. The Knight engine can be made to have a higher compression than the L-head engine but in this respect ranks about equal with the top-valve engine.

3—See 2.

4—With proper care we believe the poppet-valve engine will last as long as the sleeve-valve engine.

5—The present type of engine, while not of the exceedingly long-stroke type, can still be called a long-stroke engine, if comparison is made with the older type, in which the bore equaled the stroke.

6—A long-stroke engine must have a long connecting rod. Connecting rods, when long, are very apt to warp if not made exceedingly heavy. This increases the weight of the reciprocating parts and consequently increases strain on the engine parts.

Detecting Misfiring

Q—Is there an instrument on the market by which one can readily tell if all of the eight or twelve cylinders are firing or not?

2—Is the same hard to discover for the average person when the engine has more than six cylinders?

3—How is one able to tell whether or not all of the cylinders on a multi-cylinder car are firing while the car is being driven?—Alfred Johnson, Chicago.

1—The best instrument on the market to test out a multi-cylinder engine is the human ear. To our knowledge there has never been developed a mechanical instrument which would indicate whether the engine were firing properly or not. A good method to test a feed-type engine is to disconnect the spark plugs from one set of the cylinders, allowing the engine to run on the other set. If the engine is an eight then it will run on four cylinders and will sound exactly like a four-cylinder engine, and if a twelve, will sound like a six. The regular method of testing then can be followed. See the May 22 issue of MOTOR AGE, in which the story on engine trouble appeared.

2—No. Trouble on a twelve-cylinder is just as easy to locate as it is on a six. The regularity of the noise issuing from the two exhaust pipes gives an indication as to which set of cylinders the trouble is in. Then disconnect the other set of cylinders and allow the engine to run on the set in which the faulty cylinder is contained.

3—Experience is the only guide.

Normal Speed Is Best

Q—Which would have a tendency toward longer lift and less repair bill, a four-cylinder Waukesha tractor engine 4¼ by 5¾ with normal revolutions per minute of 900, running 850 r.p.m. or 950 r.p.m., assuming the load of each to be 2000 lb. drawbar?

2—At threshing time when the belt load varies, what speed is best? The tractor seemingly handles a three-bottom plow or a 10-ft. disk with ease, the radiator never becoming so hot but that a hand could be put on it and held there.—W. J. Rapp, San Jose, Ill.

1—If the normal running speed of your Waukesha engine is 900 r.p.m., then it is foolish to attempt to run it at other speeds continually. The designer of the engine considered all the factors pertaining to economy and power performance and decided that at 900 r.p.m. the engine would perform at its best.

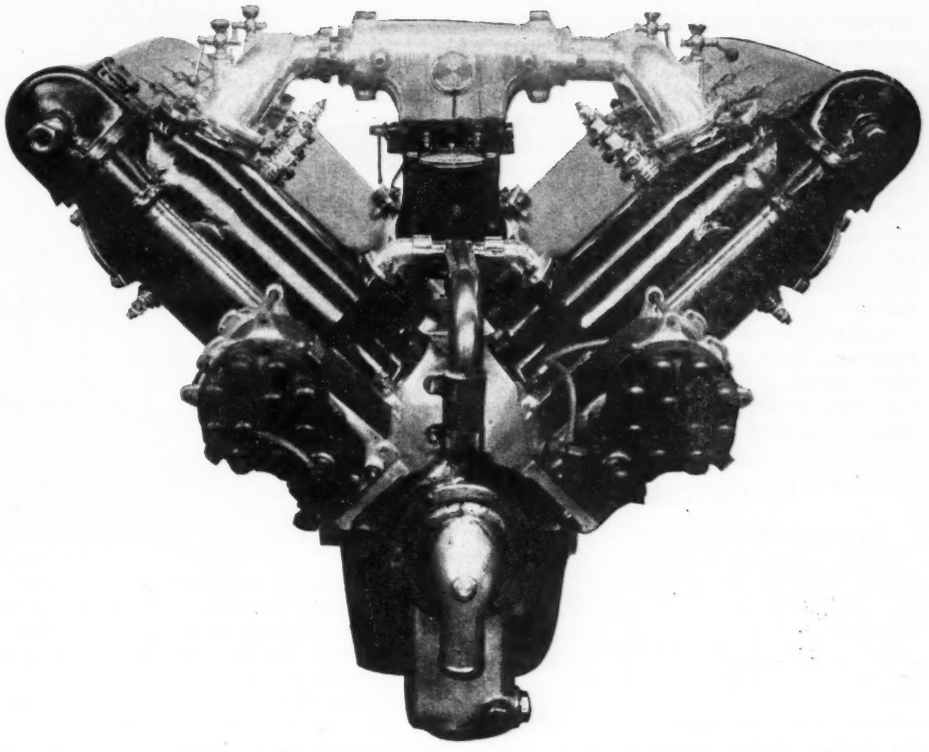


Fig. 12—Hispano-Suiza eight-cylinder V-type airplane engine

2—The most economical speed of the engine will be found at its normal rating. Threshing machines must run at a certain r.p.m. This figure can be had from the dealer, if operating instructions for the threshing machine are not at hand. It is only a question then of correctly proportioning the pulley diameters of the tractor and the threshing machine. Thus, if the tractor pulley is to run at 900 r.p.m. and the threshing machine pulley is to run at 1200 r.p.m. and the belt speed between the pulleys is 2600 r.p.m., then the tractor pulley diameter should be 11 in. and the threshing machine pulley 8¼ in. in diameter. This is calculated from the following formula:

$$D = \frac{2600 \times 12}{900 \times 3.1416}$$

This gives the diameter in inches. Since the thresher is to run one-third again as fast as the tractor, the pulley of the threshing machine must be one-third smaller in diameter than the tractor pulley.

Fordson Valve Timing

Q—What is the valve timing of a Fordson tractor?

2—How is the clutch tightened?—R. E. Kahla, Winnie, Tex.

1—Refer to Fig. 11, which shows the valve timing layout of the Fordson engine. In fitting the large time gear to the camshaft it is important to see that the first cam points in the direction opposite the zero mark. The time gears also must be meshed so the punch marks on the crankshaft gear and camshaft gear coincide. Once the time gears are set correctly the valves will open and close in proper order.

2—After the tractor has been used for some time the wear on the clutch release plate may cause the clutch pedal to strike the footrest before the clutch is disengaged fully. When this happens it can be adjusted as follows:

1—Remove the air washer.

2—Remove the dash.

3—Take out pin holding the steering gear sector on the steering arm inside the dash and remove the steering arm.

4—Remove the cam which fits on the end of the clutch pedal.

5—Advance the cam one or two notches to the right and replace, being sure the split ring which it holds is in place.

6—Try out the new position of the clutch pedal and, if satisfactory, replace the dash.

Changing Valve Lifters

Q—Can the valve lifters on a 1916 Oakland six, model 32B, be changed from the roller type to the mushroom type and still use the old camshaft?—George D. Morris, Cleveland, Ohio.

Roller-type tappets cannot be replaced successfully with mushroom tappets. A mushroom tappet is set slightly off center so that when it is hit by the cam it is revolved. This equalizes the wear on all parts of the mushroom. The roller tappet is set on the cam center, and if a mushroom roller were installed in its place, it soon would have several grooves worn in the surface of the mushroom.

Piston Clearance

Q—What is the proper clearance per inch of cylinder bore for the top, center and skirt of a cast-iron piston for the average car engine?

2—The same for aluminum alloy pistons?

3—In racing jobs, where the engine is designed to run at excessive speeds, is the piston clearance made any greater than as above?—Junius S. Wade, Augusta, Ark.

1—For cast gray iron pistons in motor cars the clearance should be at the head of the piston, 0.003 in. for each inch of cylinder bore, between the first and second ring clearance should be 0.002 in.

for each inch of cylinder bore and the remainder of the pistons should have a clearance of 0.001 in. for each inch of cylinder diameter.

2—For aluminum pistons the clearance is considerably larger than that necessary for iron pistons. For alloy pistons the head diameter is 0.005 in. for each inch of cylinder bore and 0.002 in. for each inch of cylinder bore at the top of the piston skirt. Clearances of the several lands are between these two valves.

3—Yes, but we do not know the exact amount. Each race driver has his own ideas about piston clearance, and they are very secretive and reluctant about giving out this information.

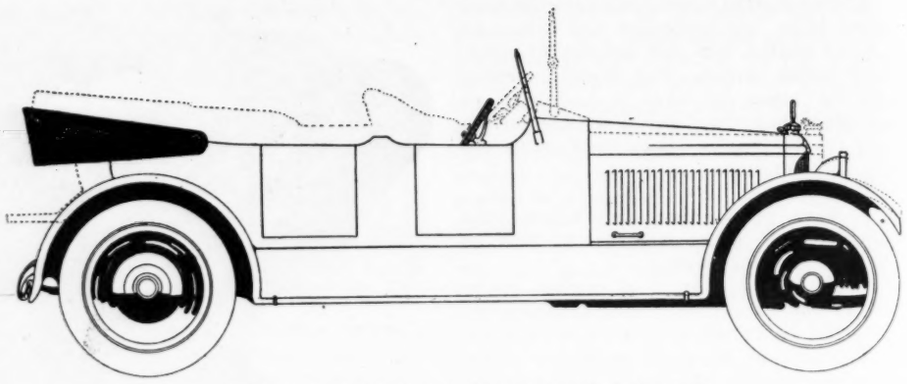


Fig. 14—Suggestion for late body for 1915 Packard

Carburetion

Adjusting Schebler on Studebaker

Q—In adjusting a Schebler carbureter, model R, when the auxiliary air valve or the low-speed adjustment is turned to the right or down do you give the engine more air or more gas?

2—In turning the high-speed adjustment to the right or up, do you make the mixture leaner or richer?—F. J. Norrisk, Detroit.

1—Turning the adjustment screws to the right enriches the mixture.

2—To the right, enriches.

Oldsmobile Carbureter Adjustment

Q—What makes a 1917 Oldsmobile eight miss when going at 35 m.p.h.? Up to this speed all cylinders will fire, but when this speed is reached the engine misses so badly that no greater speed can be obtained. Grinding the valves does not help it any.—R. L. Mangnall, LaSalle, Ill.

1—We believe the high-speed adjustment of the carbureter on your car is at fault. The correct adjustment of this is as follows, referring to the illustration in Fig. 16.

Before starting the engine turn both the low-speed screw and spray needle to their seats and set the throttle lever stop screw to approximately the correct position for closed throttle. Next open the spray needle on the bottom of the carbureter one and a half turns. With the adjustments in this position the engine can be started.

After the engine has warmed up to the normal driving temperature, place the spark lever in a fully retarded position, open the throttle quickly and, if the engine does not backfire, the mixture is slightly rich and the spray needle should be closed by turning to the right about an eighth of a turn. Open the throttle quickly again and repeat this operation until the engine does backfire, which will determine a lean mixture. Open the needle slightly to correct the mixture, which will give the correct adjustment for all high and intermediate speeds.

Adjust the throttle stop screw until the desired idling speed is secured, or about 240 r.p.m.

If the engine does not fire smoothly, the low-speed mixture is too rich and is to be corrected by backing out the low-speed screw on the side of the mixer chamber, which will admit sufficient air to make the firing even and smooth, then lock in position with the lock nut.

If the engine has increased in speed from this adjustment, restore the idling speed by unscrewing slightly the throttle stop screw and if necessary, reset the low-speed screw, both of which must be adjusted in combination.

After these operations have provided the correct adjustments for the entire range, they are permanent, and there are no conditions which will change the carbureter and its operation.

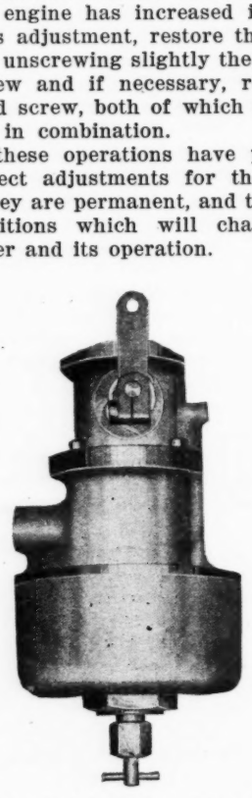


Fig. 15—U. & J. carbureter

If a more economical mixture is desired, the high and intermediate adjustments may be repeated, having the spark set in the usual driving position instead of retarded. This adjustment will slightly reduce acceleration, which will not be as responsive as a richer mixture. Be particular to leave the choker on the side of the carbureter in a wide open position and do not attempt to adjust it with the choker partly on.

U. & J. Carbureter

Q—Publish cut of the U. & J. carbureter. R. M. Pierson, Akron, Ohio.

See Fig. 15. This carbureter has no moving parts, and the only adjustment is with the thumbscrew at the bottom of the bowl. This first is closed by turning to the right and then opening one full turn. Then start the engine and when warm close to seven-eighths of a full turn.

Use of Vaporizers

Q—Would a small quantity of castor oil mixed with the engine oil improve the lubrication in a model 37 Oldsmobile?

2—Is there any efficient device on the market which will inject steam from the radiator into the intake manifold? Would this add power and improve efficiency of engine?

3—Would a small piece of camphor in the gasoline tank add much power to the car? Is it safe?

4—What tire pressure is best to use on this car when it is usually filled with 450 lb. passenger load? I do not wish to carry more air than is necessary.—C. H. Grimm, Wheeling, W. Va.

1—We do not advise you to mix castor oil with the regular mineral lubricating oil. It is the general belief that castor oil is used for aviation purposes, but this is not so. The rotary type of engine used in the battleplanes on the front were lubricated with castor oil, but the regular water-cooled engines used mineral oil.

2—Contrary to general belief, vaporizers and steam injectors do not add to the power of the engine or help very materially in the reduction of carbon deposition. An exhaustive series of tests on the effect of water injection in gasoline engines has recently been concluded at the Bureau of Standards. The results arrived at by the bureau experts are summarized in the following:

"No appreciable effect is produced upon the power, fuel economy and general operation of gasoline engines by the injection of water into the cylinders at rates varying from 0.03 to 0.44 lb. per brake horsepower-hour. When water is injected at a higher rate than 0.44 lb. per

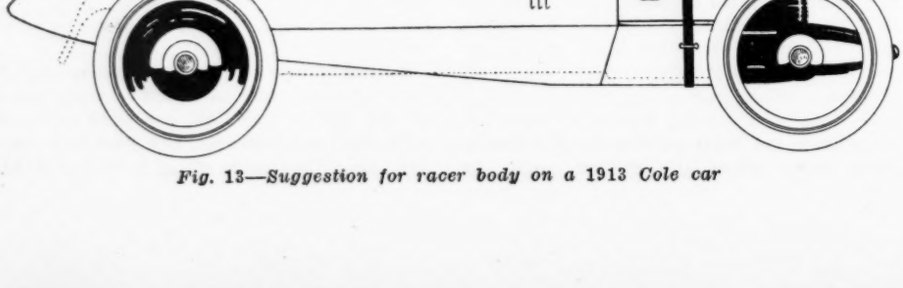


Fig. 13—Suggestion for racer body on a 1913 Cole car

brake horsepower-hour there is an appreciable decrease in the power output, fuel economy and smoothness of operation. It is quite probable that in a badly carbonized engine, or an engine of defective design, in which there are hot spots that cause pre-ignition, the injection of the water results in an increase of power. In an engine operating at high waterjacket temperature the injection of water in amounts between 2 and 8 lb. per hour produces a softening and slight reduction of carbon, this reduction not exceeding 25 per cent and being most noticeable on the piston heads and valves. However, water injection at the maximum rate also causes a considerable reduction of power."

3—Adding camphor to the gasoline in the tank will not increase the power of the engine. The much talked of idea of adding moth balls or camphor to the gasoline is fallacious. The gasoline engine is dependent on its power from the heat in the gasoline. Touch a match to a piece of camphor or a moth ball and see if it burns, and then try to decide how much heat a piece of camphor will add to the gasoline.

4—The correct pressure for tires is stamped on the tires; generally this runs 20 lb. to the inch width for straight-side fabric tires and 15 lb. for cord tires.

Rebuilding

Suggests Unusual Ford Change

Q—Could the following be done satisfactorily and would it be advisable to equip a Ford chassis, on which there is a speedster body, with oversized wheels to take 34 by 4-in. tires; and use the underslung equipment to lower the body, which would lengthen the wheelbase 3 in.? The main reason for larger wheels is to do away with the necessity of high-speed gears.—C. W. Bohn, Bismarck, N. D.

Your suggestion of using 34 by 4 tires on a Ford for speedster work is rather unusual. Ordinarily Ford speedsters are built up using the next largest over-sized tire with the gear ratio in the rear axle changed to meet conditions. However, there is no real reason why the suggested change will not work satisfactorily.

Making a Hudson Racer

Q—What changes should be made in a 1918 model Hudson Super-Six in engine, gear ratio and frame and every other essential thing to equip it for competition in a 300-mile road race?

2—Are the Hudsons driven by Pullen this year and by Ira Vail two years ago very similar in construction and dimensions?

3—Should aluminum pistons be used?

4—What kind of force feed oiling system would you recommend?

5—What kind and size of carbureter?

6—Should changes be made in the manifolds and valves and seats?

7—How could the cooling system be made more efficient?—J. E. Reynolds, Los Angeles, Cal.

1—We have been advised by the Hudson factory that it is not necessary to make many changes in the regular Hudson stock model to increase the speed. With this in mind the only change that we would like to offer is the rear axle gear ratio. At present this ratio for your car is 4.08 to 1. A few prominent race drivers have taken the stock Hudson chassis and changed this ratio to 3 to 1 and have secured very good results, as the records show.

2—These cars are practically the same.

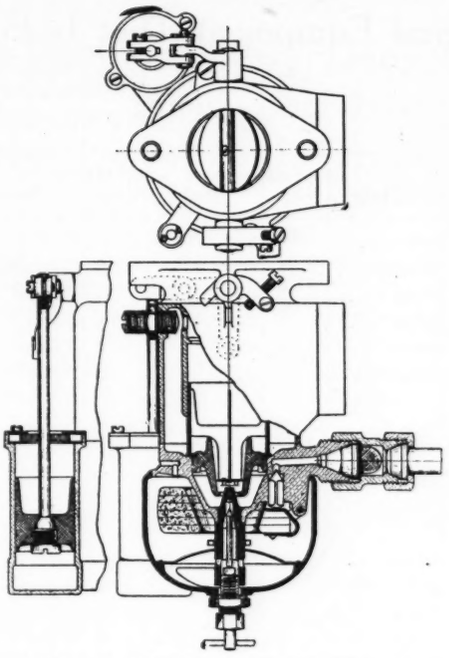


Fig. 16—Johnson carbureter on Oldsmobile

3—We do not think it necessary to install aluminum pistons.

4—The present system is very good, and we do not advise any change.

5—Obviously MOTOR AGE cannot recommend any one carbureter over another, but why not equip your car with some one of the carbureters such as the prominent race drivers use?

6—We do not think it necessary to change the manifold or the valve size.

7—A more efficient cooling fan driven at a slightly higher speed would be about all the change that is necessary.

Underslinging a Ford

Q—Publish and explain how to underslung a Ford for racer or give number of MOTOR AGE that has it.—J. D. Droke, Tunica, Miss.

We have from time to time published method for lowering the Ford frame, the last one appearing May 22.

Rebuilding a Ford

Q—Explain how to rebuild a Ford according to design published May 15.—William Klakr, New Haven, Conn.

Rebuilding a Ford into a speedster is a job the success of which is dependent upon the method by which the frame is lowered. Generally an angle bracket is attached to the front of the frame and the springs attached to the bracket. This lowers the frame 4 or 5 in. and lengthens the wheelbase about the same amount. In order that the increased wheelbase may not necessitate a change in the propellor shaft, it is necessary to move the engine back in the frame an amount equal to the distance by which the wheelbase is lengthened. The building of a new radiator is best left to a radiator concern, and the building of a speedster body must be worked out by each individual himself, for the equipment and tools possessed by the average layman is varied.

Plans for Speedster Design

Q—Where can I obtain plans for Ford speedster as illustrated in Fig. 14 page 44 in May 15 issue of MOTOR AGE?—Schuyler Spurrier, Okmulgee, Okla.

We do not believe that you can secure this plan any place, but if you take the design to a body builder, a number of whom advertise in our columns, he can build a body according to the design without a plan. His special machinery and equipment will enable him to do this.

Wants Working Plan

Q—Where can I get a working plan for the streamline design for Packard speedster shown on page 45 of the May 15 issue?—William A. Mehl, Towson, Md.

We do not furnish working plans or blueprints of these designs. Body builders are equipped with the necessary tools and machinery to build the car according to the design submitted. Body builders are listed in the advertising columns of MOTOR AGE, and we advise you to consult them.

Design for Packard Touring

Q—Publish body design for a 1915-16 Packard something on the style of the latest Marmon. Could I have a pointed radiator built to order for this car? I want something snappy.—G. F. Hausen, 89½ 17th Street North, Portland, Oregon.

This design is shown in Fig. 14. Radiators of this type can be had from specialty radiator builders such as the National Can Co., Detroit, and the California Trailer & Radiator Co., India and C streets, San Diego, Cal.

Cyclecar Design

Q—Publish sketch of small car using motorcycle engine and wheels.

2—Is there a company where I can secure parts to build such a car?—Steve Kutilla, New Orleans, La.

1—Fig. 17 illustrates a small car using a motorcycle engine.

2—We do not know of a concern that will furnish you with parts to build this car.

Cole Race Car Design

Q—Publish a racing body sketch for a 1913 Cole.

2—Illustrate best method to lower steering wheel.—N. Batinovich, Aberdeen, Wash.

1—In Fig. 13 we show a design for a race car using this model Cole.

2—See answer to Mr. Wheat.

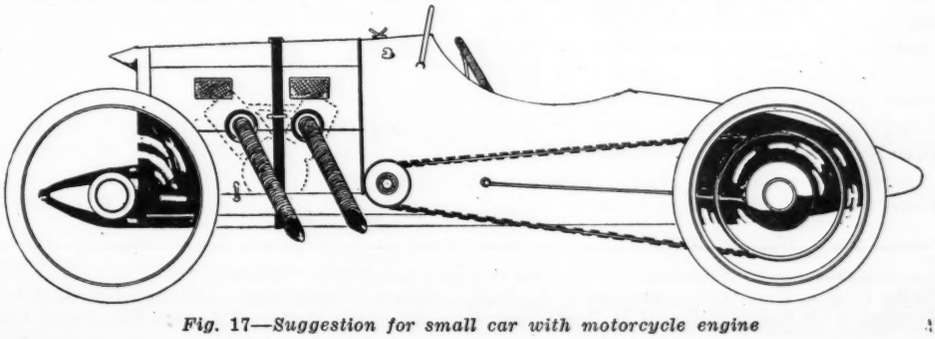


Fig. 17—Suggestion for small car with motorcycle engine

Specifications of the Electrical Equipment That Is Found on 1919 Passenger Cars

Make and Model	IGNITION			GENERATOR		MOTOR		BATTERY			Wiring System	Type of Electric System	FUSES		
	System	Make	Control	Make	Voltage	Make	Voltage	Make	Amp. Hr.	Voltage			Type	Volts	Amp
Allen 41	Single	Conn	Hand	A-L	6	A-L	6	U. S. L	90	6	1	GI	GT	5	15
American B	Single	At-Kent	Hand	West	6	West	6	Columbia	80	6	1	S	3-A	1.250	20
Anderson All	Single	Conn	Hand	West	6	West	6	Willard		6	1	S	SAE	6	5
Apperson 8-19	Single	Remy	Hand	Bijur	6	Bijur	6-8	Willard	90	6	1	S	Open	1.250	10
Auburn 6-39	Single	Remy	Hand	Remy	6	Remy	6	Willard	80	6	1	S		6-8	25
Austin 12	Single	Delco		Delco	6	Delco	6	Willard		6	1	S	None		
Biddle H	Single	Eisemann	Hand	G & D	6	G & D	6	Willard	90	6	1	S	GT	6	10
Brewster	Single	Conn		A-L	6	A-L	6								
Briscoe 4-24	Single	Conn	Hand	A-L	6	A-L	6	U. S. L	80	6	1	GI	GT	6	15
Buick	Single	Delco	Hand	Delco	6	Delco	6	U. S. L	80	6	1	S			
Cadillac 57	Single	Delco	Hand	Delco	6	Delco	6	Exide		6					
Campbell C-4	Single	At-Kent		A-L				Willard			1				
Case U-19	Single	West	Hand	West	6	West	6	Willard	117½	6	1	GI	3AGT	50	15
Chalmers 35C	Single	Bosch-Rem	Hand	West	6	West	6	Willard	93		1				
Chandler	Single	Bosch	Hand	West	6	West	6	Willard	100	6	1	S	Cart	6	20
Chevrolet All	Single	Remy	Hand	A-L	6	A-L	6	Willard	80	6	1	GI	GT	6	20
Cole 870	Dual	Delco	H & A	Delco	6	Delco	6	Prest-O-L	50	6	1	S			
Columbia All	Single	At-Kent	Hand	Ward-L	6	Ward-L	6	Prest-O-L	80	6	1	S			
Comet C-51	Single	Delco	H & A	Dyneto	6	Dyneto	6	Willard	75	6					
Crow-Elkhart K-36	Single	Conn	Hand	Dyneto	6	Dyneto	6	Willard		6					
Cunningham V-3	Single	Delco	Hand	West	6	West	6	Willard	120		1				
Daniels 8-B	Single	West	Hand	West	6	West	6	Willard	100		1	S	GT	5-8	15
Davis		Bosch		West	6	West	6	Willard							
Dixie Flyer	Single	Conn	Hand	Dyneto	6	Dyneto	6	Willard	6-60		2				
Dodge	Single		H & A	N. E.	12	North East		Willard		12	1	GM	Encl	1-50	10
Dorris	Single		Hand	West	6	West		Willard	115	6	1	S	GT	5-8	15
Dort 15	Single	Conn	Hand	West	6	West	6	Willard	85	6	1*	S		6	10
Elcar All	Single	At-Kent	Hand	Dyneto	7	Dyneto	6	Willard	90	6	1				
Elgin H	Single	Wagner	Hand					Willard	90		1				
Essex A	Single	Delco	H & A	Delco	7	Delco	6		105	6	1	S			
Ford T*	Single	Own	Hand	Own		Own		Exide	30	6	1	S			
Franklin 9	Single	At-Kent	Auto	Dyneto	12			Willard	50	12		GM	GT	122	15
Geronimo		Delco		Dyneto	6	Dyneto	6	Willard	88	6	1	S			
Glide 6-40		West		West	6	West	6	Willard	80	6	1	GI	Cart	250	15
Harroun	Single	At-Kent	Hand	Remy	6	Remy	6	Willard	80	6	1				
Harvard 4-20		At-Kent		Wagner	6	Wagner	6	Nat. Carb			1	S			
Hatfield A		Conn		Dyneto	6	Dyneto	6	Willard	100	6	1	GI			
Haynes All	Single	Delco	Auto	Leece-N	6	Leece-N	6	Willard	120	6	2	GI	C. B		
Hollier All	Single	At-Kent	Hand	Splitdorf	6	Splitdorf	12	Gould	50	6	1	GM			
Holmes	Single	Eisemann	Auto	Dyneto	12			Columbia	100	12	2	S	2A	15	15
Hudson Super-Six	Dual	Delco	Hand	Delco	7	Delco	7	Exide	100	6	1	GM			
Hupmobile R	Single	At-Kent	Hand	West	7	West	7	Willard	87½	6	1	S	Encl	6	10
Jackson	Single	Remy	S-A					Prest-O-L	120	6	2	S	3 A	6-8	20
Jones	Single	Remy	Hand	West	6	West	6	Prest-O-L	120	6	1				
Jordan	Single	Delco	H & A	Bijur	6	Bijur	6	Willard	109.8	6	1	S	C. B		
King 8	Single	At-Kent	H & A	Bijur	6	Bijur	6	Willard	117.5	6	1				
Kissel	Single	Remy	Hand	Remy	6	Remy	6	Willard	90	6	1	S	3 A. G		20
Kline 642-88	Single	Conn	Hand	West	6	West	6	Prest-O-L	80	6	1	S	5 A. G	6	
Lexington R-19	Single	Conn	Hand	West	6	West	6	Willard	100	6	1	S	G. T	6	

ABBREVIATIONS: *Starting and Lighting in closed models only. Ignition: *At-K*, Atwater-Kent; *Conn.*, Connecticut; *West*, Westinghouse; *Auto*, Automatic; *H & A*, Hand and Automatic; *S. A.*, Semi-Automatic. Generator: *A-L*, Auto-Lite; *G & D*, Gray & Davis; *Leece-N*, Leece-Neville; *Ward-L*, Ward-Leonard; *West*, Westinghouse; *N. E.*, North East; *Split*, Splitdorf. Motor: *A-L*, Auto-Lite, *G & D*, Gray & Davis; *Leece-N*, Leece Neville; *West*, Westinghouse.

Giving Ignition, Starting, Lighting, Battery, Lamp, Spark Plug and Horn Data

Base Contact	LAMP CANDLEPOWER, VOLTAGE AND TYPE OF BASE								SPARK PLUGS			Horn	Make and Model
	HEADLIGHTS		SIDELIGHTS		TAILLIGHTS		DASHLIGHT		Make	Diam. Inches	Thread Pitch		
	Volts	CP.	Volts	CP.	Volts	CP.	Volts	CP.					
Single	6-8	18	*6-8	4	6-8	2	6-8	2	Champion	7/8	18	Garford	Allen 41
Single	6-8	15	*6-8	4	6-8	2	d6-8	2		7/8	18	Sparton	American B
Single	6-8	12	6-8	2	6-8	2	6-8	2	A. C.	7/8	18	Klaxon	Anderson All
Single	6-8	15	*6-8	4	6-8	2	d6-8	2	A. C.	7/8	18	Sparton	Apperson 8-19
Single	6-8	15	*6-8	4	6-8	2	d6-8	2	Rajah	7/8	18	E. A.	Auburn 6-39
Single	6-8	24	6-8	16	6-8	6	6-8	3	Reflex	7/8	18	Sparton	Austin 12
Single	6-8	18	*6-8	4	6-8	2	d6-8	4	Splitdorf	7/8	18	Klaxon	Biddle H
									Herz-Boug.	7/8	18	Klaxon	Brewster
Single	6-8	21			6-8	4	d6-8	4	Champion	7/8		Schwarze	Briscoe 4-24
Single	6-8	16			6-8	3	6-8	3	A. C.	7/8	18	Stewart	Buick
	6-8	18	6-8	6	3-4	2	3-4	2	Titan			Auto-horn	Cadillac 57
					6-8				A. C.			Garford	Campbell C-4
Single	6-8	18	6-8	4	6-8	2	d6-8	2	A. C.	7/8		Klaxon	Case U-19
Single	6-8	15	6-8	4	6-8	2	6-8	2	A. C.			Sparton	Chalmers 35-C
Single	6-8	16	6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Trojan	Chandler
Single	6-8	20	6-8	4	6-8	4	6-8	4	A. C.	7/8	18	Klaxon	Chevrolet All
Single	6-8	21	*6-8	12	6-8	4	d6-8	6	A. C.	7/8	18	Sparton	Cole 870
Single	6-8	15	*6-8	4	6-8	2	d6-8	2	Champion	7/8	18	Schwarze	Columbia All
Single	6-8		3-4		3-4		3-4		Champion	7/8	18	Trojan	Comet C-51
	6-8	16	6-8	4	6-8	2	6-8	2	Champion	7/8		E. A. Lab.	Crow-Elkhart K-36
	6-8	21	6-8	6	6-8	2	6-8	4	Champion			Sparton	Cunningham V-3
Single	6-8	18	6-8	2	6-8	4	6-8	2	A. C.	5/8	18	Klaxon	Daniels 8-B
	6-8	18			6-8	2	6-8	2	A. C.	7/8		Klaxon	Davis
Double	6-8	15			3-4	2	3-4	2	Champion			Garford	Dixie Flyer
Single	12-18	15			12-18	2	12-18	2	A. C.	7/8	18	Klaxon	Dodge
Single	6-8	21	*6-8	4	6-8	4	6-8	4	Champion A. C.	7/8	18	Klaxon	Dorris
Single	6-8	15			6-8	4	6-8	2	A. C.	7/8	18	Schwarze	Dort 15
	6-8	15	6-8	4	5-8	2	6-8	2	Champion			Klaxon	Elcar All
Double	6-8	15			6-8	3	6-8	2	Champion	7/8	18	E. A. L.	Elgin H
Single	6-8	15			3-4	2	*3-4	2	A. C.	18 m.m.	1.5 m.m.	Sparton	Essex A
	6-8	17	6-8	2	6-8	2			Champion	½	pipe	Own	Ford T
Double	12-18	21	*12-18	4	8	2	12-18	2	Splitdorf Benton	7/8	18	Klaxon	Franklin 9
Single	6-8	21			6-8	2	6-8	2	Champion	7/8	18	Trojan	Geronimo
Single	5-8	15	*6-8	4	6-8	2	d6-8	2	Champion	7/8	18	Klaxon	Glide 6-40
	6-8	20			3-4	6	3-4	6	A. C.			Schwarze	Harroun
	6-8		3-4		3-4		*3-4			7/8	18		Harvard 4-20
Single	6-8	15	*4-8	4	6-8	4	6-8	2	A. C.	7/8	18	Ecco	Hatfield A
Double	6-8	18	*6-8	12	6-8	2	6-8	2	A. C.	7/8	18	Klaxon	Haynes All
Single	6-8	15			3-4	2	d*3-4	2	Champion	7/8	18	Sparton	Hollier All
Double	12-16	30	*12-16	4	6-8	2	6-8	2	Bethlehem	7/8	18	Klaxon	Holmes
Single	6-8	5	6-8	4	3-4	2	*3-4	2	A. C.	7/8	18	Sparton	Hudson Super Six
Single	6-8	15	6-8	2	6-8	2	6-8	2	A. C.	7/8	18	Trojan	Hupmobile R
									A. C.				Jackson
Double	6-8	15	*6-8	4	s6-8	2	s6-8	2	Champion	7/8	18	Newtone	Jones
Single	6-8	21	*6-8	4	6-8	3	6-8	3	A. C.	7/8	18	Sparton	Jordan
Single	6-8	18	*6-8	4	6-8	4	6-8	2	Champion	7/8	18	E. A. L.	King 8
Single	6-8	18	*6-8	4	6-8	2	6-8	2	A. C.			Sparton	Kissel
Single	6-8	15			6-8	4	d6-8	4	Champion	7/8	18	Klaxon	Kline 642 S. 8
Single	6-8	32	*6-8	8	6-8	2	d6-8	4	Champion Bethlehem	7/8	18	Klaxon	Lexington R-19

Battery: *Prest-O-L*, Prest-O-Lite. Wiring system: *GI*, Generator and Ignition combined; *GIM*, Generator, Ignition, Motor combined; *S*, Generator, Motor, Ignition separate; *GM*, Generator and Motor combined. Fuses: *GT*, Glass Tube; *Cart*, Cartridge; *C. B.* Circuit Breaker. Lamps: *Dashlights in series with taillights; headlight contains sidelight; d,—double contact; s,—single contact.

Specifications of the Electrical Equipment That Is Found on 1919 Passenger Cars

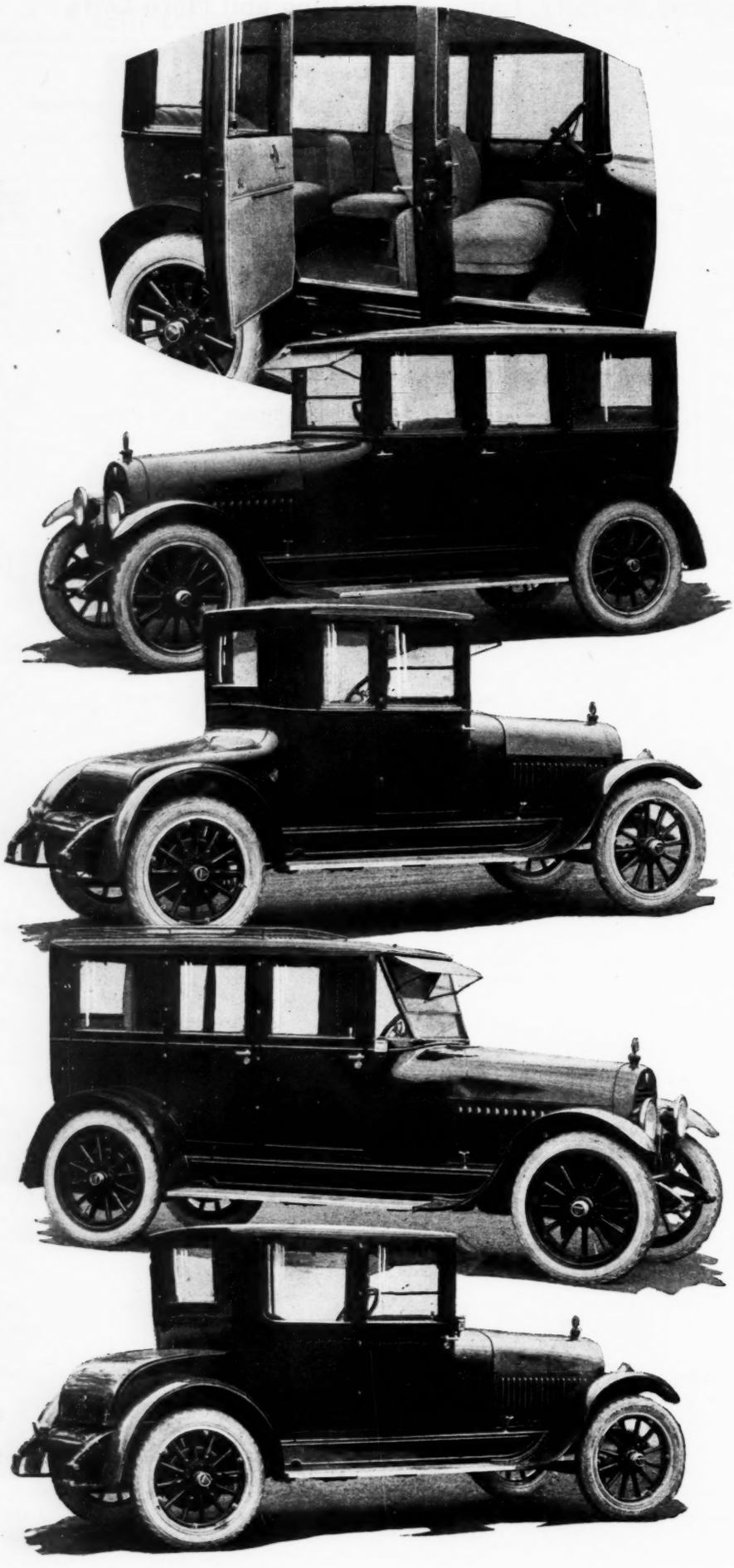
Make and Model	IGNITION			GENERATOR		MOTOR		BATTERY			Wiring System	Type of Electric System	FUSES		
	System	Make	Control	Make	Voltage	Make	Voltage	Make	Amp. Hr.	Voltage			Type	Volts	Amp
Liberty 10B	Dual	Delco	Hand	Delco	6	Delco	6	Willard	88	6	1	GI			
Locomobile 38-2	Dual	Berling	Hand	West	6	West	6	Willard	120	6	1	S	G. T.	6	10
Maibohm B	Single	At-Kent	Hand	Wagner	6	Wagner	6	Willard	80	6	1	S	A 1	6	30
Marmon 34	Single	Bosch	Hand	Bijur	6	Bijur	6	Prest-O-L	120	6	1	S	Cart		20
Maxwell 25	Single		Hand	Simms-Huff	12	Simms-Huff	12	Prest-O-L	35	12	1	GM	Cart	12	20
McFarlan 127	Double	Bosch	Hand	West	6	West	6	Willard	5 Amp. 27.8 h. p.	6	1	GI	5 A. G	6	
Mercer Ser. 4	Single	Berling	Hand	Remy	6	Remy	6	Willard	90	6	1	S	Cart		10
Mitchell E-40	Single	Remy	Hand	Remy	6	Remy	6	Willard	100	6	2	GM	Cart	6	20
Moline Knight L	Dual	Conn	Hand	Wagner	6	Auto-Lite	6	Willard	117	6	1	S	Cart	250	20
Monitor	Single		Hand	Dyneto	6	Dyneto		Willard	88	6	1				
Moon All	Single	Delco	Auto	Wagner	6	Wagner	6	Exide	80	6	1				
Moore 30	Single	Conn	Hand	A-L	6	A-L	6	Willard	80	6	2				
Nash	Single	Delco	H & A	Delco	6	Delco	6	Willard	100	6	1	S			
National 6	Single	Delco	H & A	West	6	West	6	Prest-O-L	110	6	1	S	G		5
National 12	Single	Delco	H & A	Bijur	6	Bijur	6	Prest-O-L	110	6	1	S	G		10
Nelson		Bosch	Hand	U. S. L.	12	U. S. L.	12	Willard	72	12	2	S	G	12	
Oakland 34-B	Single		Hand	Remy	6	Remy	6	Prest-O-L	85	6	1	GI			
Oldsmobile All	Single	Remy	Hand	Delco	6	Delco	6	U. S. L.	80	6	1				
Olympian 45	Single	Conn	Hand	A-L	6	A-L	6	U. S. L.		6					
Overland 90	Single	Conn	Hand	A-L	6-8	A-L	6	U. S. L.	75	6-8		GI	Glass	6	20
Packard 3-25	Single	Delco	H & A	Bijur	6	Bijur	6	Willard	120	6	1	S	G. T.	6	10
Paige All	Single	Remy	Hand	Gray & Davis	6	Gray & Davis	6	Willard	108.4	6	1	S	G		20
Paterson 6-46	Dual	Delco	Hand	Delco	6	Delco	6	Willard		6	1				
Peerless Ser. 4	Single	At-Kent	H & A	A-L	6	A-L	6	Willard		6	1				
Pierce-Arrow B-5	Double	Bosch	Hand	West	6-8	West	6	Exide-Willard	135	6	1		5 A. G	6-8	10
Pilot 6-45	Dual	Delco	Hand	Delco	6	Delco	6	Prest-O-L		6	1	GI			
Premier 6-C	Single	Delco	Hand	Delco	6	Delco	6	Willard	123.5	6	1	S			
Reo T & U	Single	Remy	Hand	Remy	6	Remy	6	Willard	108.5	6	2	GI	Wire	6	5
Revere	Single	Bosch	Hand	North East	6	North East	6	Willard	120	6	1	S			
Roamer 6-54	Single	Bosch	Hand	Bijur	6	Bijur	6	Willard	115	6	1	S	3A	6	10
Saxon Y-16	Single	Remy	Hand	Wagner	6	Wagner	6	Prest-O-L	60	6	1	S	Cart	6-8	15
Sayers	Single	Delco		Delco	6	Delco	6	Willard		6	1				
Scripps-Booth	Single	Remy	Hand	Remy		Remy	6	Prest-O-L	80	6	1				
Seneca H	Single		Hand	Allis Chalm	6			Willard	88	6	1	GM			20
Singer 19	Single	Bosch	Hand	West	6	West	6	Willard	115	6	1	S	G. C		5&10
Standard 8 G	Single	Split	Hand	West	6	West	6	Willard	160	6	1				
Stanley 735				Remy	6			Willard	100	6	1	G	Cart	6	20
Stearns SKL-4	Single	Remy	Hand	Remy	12	Remy	12	Willard	61.5	12	1	S			20
Stephens 80	Single	A-L	Hand	A. L.	6	A-L	6	U. S. L.	116	6	1	S			
Studebaker EH	Single	Remy	Hand	Wagner	6-8	Wagner	6	Willard	80	6	1	S	Cart	6	10
Stutz G	Double		Hand	Remy	6	Remy	6	Willard		12	2				
Templar 445	Single	Remy	H & A	Remy	6-8	Remy	6	Columbia	100		1				
Tulsa A-D-1	Single	Delco	Hand	Dyneto	6	Dyneto	6	Willard	90	6	1	S	G. T.	6	15
Velie 38	Single	Remy	Auto	Remy	6	Remy	6	Willard	105	6	1	S	Wire	6	5
Westcott	Single	Delco	H & A	Delco	6	Delco	6	Willard	109.8	6	1	S	C. B	7	25
Willys-Knight 88-4	Single	Conn	Hand	A-L	6-8	A-L	6	U. S. L.	120	6	2	GI	G. T.	6	20
Winton Six All	Single	Bosch	Hand	Bijur	6	Bijur	6	Willard	110	6	1	S	3A	6	20

ABBREVIATIONS: *Starting and Lighting in closed models only. Ignition: *At-K*, Atwater-Kent; *Conn.*, Connecticut; *West*, Westinghouse; *Auto*, Automatic; *H & A*, Hand and Automatic; *S. A.*, Semi-Automatic. Generator: *A-L*, Auto-Lite; *G & D*, Gray & Davis; *Leece-N*, Leece-Neville; *Ward-L*, Ward-Leonard; *West*, Westinghouse; *N. E.*, North East; *Split*, Splitdorf. Motor: *A-L*, Auto-Lite, *G & D*, Gray & Davis; *Leece-N*, Leece-Neville; *West*, Westinghouse

Giving Ignition, Starting, Lighting, Battery, Lamp, Spark Plug and Horn Data

Base Contact	LAMP CANDLEPOWER, VOLTAGE AND TYPE OF BASE								SPARK PLUGS			Horn	Make and Model
	HEADLIGHTS		SIDELIGHTS		TAILLIGHTS		DASHLIGHT		Make	Diam. Inches	Thread Pitch		
	Volts	CP.	Volts	CP.	Volts	CP.	Volts	CP.					
Single	6-8	15	*6-8	4	6-8	2	6-8	2	A. C.	7/8	18	United	Liberty 10B
Single	6-8	21	6-8	6	6-8	4	6-8	2	A. C.	7/8	18	Klaxon	Locomobile 38-2
Single	6-8	16	6-8	4	3-4	2	*3-4	2	Champion	7/8	18	E. A. Lab.	Maibohm B
Single	6-8	30	*6-8	9	6-8	2	6-8	4	A. C.	7/8	18	Sparton	Marmon 34
Double	12-16	24	*12-16	2	12-16	2	12-16	2	Champion	7/8	18	Schwarze	Maxwell 25
Single	6-8	21	*6-8	12	6-8	2	6-8	2	A. C.	7/8	18	Klaxon	McFarlan 27
Single	6-8	24	*6-8	4	6-8	4	6-8	4	Champion	7/8	18	Sparton	Mercer Ser. 4
Double	6-8	14			s6-8	4	6-8	4	A. C.	7/8	18	A. E. L.	Mitchell E-40
	*6-8	15	*6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Klaxon	Moline Knight L
									Champion	7/8	18	Klaxon	Monitor
Single	6-8	18			6-8	2	d6-8	2	Champion	7/8	18	Trojan	Moon All
Single	6-8	20	6-8		6-8	2			Champion	7/8	18	Garford	Moore 30
Single	6-8	18	*6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Stewart	Nash
Single	6-8	16	*6-8	6	6-8	4	d6-8	2	A. C.	7/8	18	Sparton	National 6
Single	6-8	18	*6-8	6	6-8	4	d6-8	2	A. C.	7/8	18	Trojan	National 12
	12-16	16	12-16	4	12-16	2	12-16	2					Nelson
Single	6-8				6-8	2	6-8	2	A. C.	7/8	18	Klaxon	Oakland 34-B
	6-8	15			6-8	2	6-8	2	A. C.	7/8	18	Optional	Oldsmobile 37-A
									Champion			E. A. Lab.	Olympian 45
	6-8	12			3-4	2	*3-4	2	Champion	1/2		Auto-Lite	Overland 90
Single	6-8	24	*6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Sparton	Packard 3-25
Single	6-8	18	*6-8	4	6-8	2	d6-8	2	A. C.			Torjan	Paige All
	6-8	24	6-8	4	3-4	3	*3-4	3	A. C.			E. A. Lab.	Paterson 6-46
Single	6-8	18			6-8	4	6-8	2	A. C.			Sparton	Peerless Ser. 4
Single	6-8	21	*6-8	4	6-8	4	6-8	4	A. C.	7/8	18	Klaxon	Pierce-Arrow B-5
Single	6-8	15			6-8	6	6-8	6	A. C.	7/8	18	Schwarze	Pilot 6-45
Double	6-8	21	*6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Stewart	Premier 6-C
Double	6-8	15			3-4	2	*3-4	2	A. C.	7/8	18	Trojan Klaxon	Reo T & U
Double	6-8	20	*6-8	8	6-8	4	6-8	4	Rajah	7/8		Klaxon	Revere
Single	6-8	16	*6-8	4	6-8	4	d6-8	4	Champion	7/8	18	Sparton	Roamer 6-54
Single	6-8	15			6-8	2	6-8	2	A. C.	7/8	18	Schwarze	Saxon Y-16
Single	6-8	15			6-8	2	d6-8	2	Champion			Stewart	Sayers
Single	6-8	15			6-8	2	6-8	2	A. C.			Trojan Klaxon	Scripps-Booth
Single	6-8	15	6-8	2	6-8	2	d6-8	2	A. C.			Fitzgerald	Seneca H
Double	6-8	32	6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Klaxon	Singer 19
Single	6-8	32	*6-8	4	6-8	2	6-8	2	Splitdorf	7/8	18	Klaxon	Standard 8-G
Single	6-8	18	*6-8	2-4-6	6-8	2	6-8	2				Klaxon	Stanley 735
Single	12-16	12	*12-16	4	12-16	2	12-16	2	A. C.	7/8	18	B.& A. Lab	Stearns SKL-4
Single	6-8	15	6-8	2	6-8	2	6-8	2	Champion			Trojan	Stephens 80
Single	6-8	12			6-8	2	6-8	2	Champion	1/2		Sparton	Studebaker EH
		15	*	4		4		4	A. C.			Klaxon	Stutz G
Single	6-8	18	*6-8	4	6-8	2	6-8	2	Champion	7/8		Schwarze	Templar 445
Single	6-8	21	6-8	2	6-8	2	d6-8	2	Champion	7/8	18	Klaxon	Tulsa A-D-1
Single	6-8	15	*6-8	4	6-8	4	d6-8	4	Champion	7/8	18	Sparton	Velie 38
Single	6-8	15	*6-8	4	d3-4	2	d*3-4	2	A. C.	7/8	18	Klaxon	Westcott
4 8-D2	6-8	16			3-4	2	*3-4	2	Champion	7/8	18	Klaxon A. L.	Willys-Knight 88-4
Single	6-8	21	6-8	12	6-8	4	6-8	4	Champion	7/8	18	American Electric	Winton Six 22

Battery: *Prest-O-L*, Prest-O-Lite. Wiring system: *GI*, Generator and Ignition combined; *GIM*, Generator, Ignition, Motor combined; *S*, Generator, Motor, Ignition separate; *GM*, Generator and Motor combined. Fuses: *GT*, Glass Tube; *Cart*, Cartridge; *C. B.*, Circuit Breaker. Lamps: *Dashlights in series with taillights; headlight contains sidelight; d,—double contact; s,—single contact.



Hudson Winter Program

Five New Body Types in Closed Car Line for 1919-1920 Season

Previous Models Improved in Detail Throughout

FIVE new body types will make up the line of Hudson Super-Six closed models for the 1919-1920 winter season. These will be a sedan, coupe, cabriolet, touring limousine and limousine. They all have been improved in detail throughout and are developments of previous models.

The sedan departs from previous practice in that the front seat is continuous across the body. This not only gives more room in the front seat but also acts as a tie across the body, giving increased rigidity. The two auxiliary seats are more luxuriously upholstered than heretofore and these face forward. Ample room is provided for seven passengers. The doors now are carried on three hinges and are equipped with leather cover and steel robe rail. There are four doors on the new Hudson sedan. The door windows all open wide and are lowered and raised by revolving lifts. The rear windows are adjusted by fabric-covered straps. There is also a jeweled dome light over the rear seat and a ventilator on the cowl.

Movable Glass Partition

The touring limousine can be used either as a chauffeur-driven car or an owner-driven. By raising the glass partition from the back of the front seat it becomes the formal type of limousine. When the glass partition is lowered, however, the front and rear compartments are thrown together. There is a luggage rack on the top for touring, and a heater in the rear compartment. The door windows are raised and lowered by revolving lifts. The car is noteworthy for the completeness of its equipment. There is a smoking set and vanity case in the rear compartment and jeweled dome lights in both compartments. The shades are silken and roller type, being provided for the rear windows and also for the partition separating the front and rear compartments. The fittings include ivory-trimmed handles and a clock and mirror in front of the driver.

The coupe is a four-passenger of conventional lines. The auxiliary seat folds snugly out of the way when not in use, but when raised there is ample room for four passengers. This car also is provided with a heater, and there are silk roller curtains on the side and rear windows. The doors and windows in this

From top to bottom—Interior of Hudson sedan, showing continuous front seat; the exterior of the sedan; the cabriolet; the touring limousine; and the coupe

car are raised and lowered by revolving lifts, and the side windows may be adjusted by small handles.

The cabriolet is a continuation of what has proved a popular Hudson model for the last five years. The driver's seat in this car is staggered to afford freedom of motion in handling the control levers, and there is a luggage space provided behind the driver's seat and also in a compartment under the rear deck. This car, like the other Hudson inclosed cars, is equipped with silken roll curtains on the rear window and has a jeweled dome light in the top. The door windows are operated by a revolving lift and the side windows by straps. All fixtures are nickel plated.

The cars are finished in dark blue with black fenders. In addition the coupe and cabriolet have white striping.

The following list gives price of each model:

Sedan	$2,775
Coupe	2,950
Cabriolet	2,450
Touring limousine	3,300
Limousine	3,650

Dayton System for Ford Cars

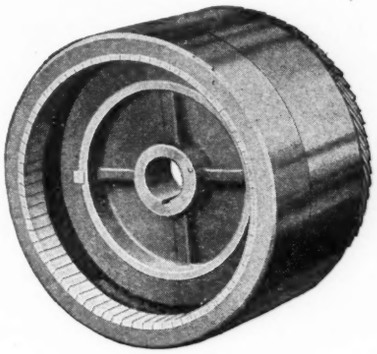
THE starting and lighting system for Fords made by the Dayton Electrical Mfg. Co., Dayton, Ohio, is of the one-unit type and couples to the engine at the forward end of the crankshaft. The system employs two 6-volt batteries connected in series by the switch for starting, giving 12 volts, and for generating and lighting purposes uses the two batteries connected in parallel, giving only 6 volts.

The construction of the commutator is novel, because no cotton-insulated wire is used in its construction. In its place are flat copper strips, bent into the shape of hairpins. These are threaded through the armature laminations, and the whole then is impregnated with Bakelite. After this insulating material is baked the armature is one solid mass, impervious to water and oil. The ends of the copper strips which come through the armature laminations are electrically welded to the commutator segments. The brushes of this machine are on the inside of the commutator, making contact with the internal commutator. This construction protects the brushes from the dust and oil. The starting switch is combined with the cut-out. The machine has twelve poles and a brush for each pole. Two of these brushes are of very soft graphite and lubricate the commutator.

EQUIPMENT AND ACCESSORY MEET

New York, June 14—The Material Handling Machinery Manufacturers Association held a coalition meeting of all manufacturers of mechanical handling machinery and equipment and accessories in the United States at the Hotel Astor June 11. This included all manufacturers of cranes, winches and hoists; elevators; gravity and power conveying machinery and apparatus; industrial trucks, tractors and trailers; bulk handling machinery; and all makers of equipment and accessories such as storage batteries, bearings, ropes for hoists, buckets, electric controllers and apparatus, etc. Advertising managers of companies manufacturing these products met at a preliminary conference at the Hotel Astor June 10 at 8 p.m., at which time it was planned to form an advertising council of the M.H.M.M.A.

Among the speakers for the day meeting were James H. Collins, special writer of business articles, and Francis Holley, director of the Bureau of Commercial Economics. A general Forum discussion was to be conducted in the afternoon, and a mass meeting planned for the evening, at which addresses were made by Theodore Burton, former United States senator, and Murray Hulbert, commissioner of docks, New York.



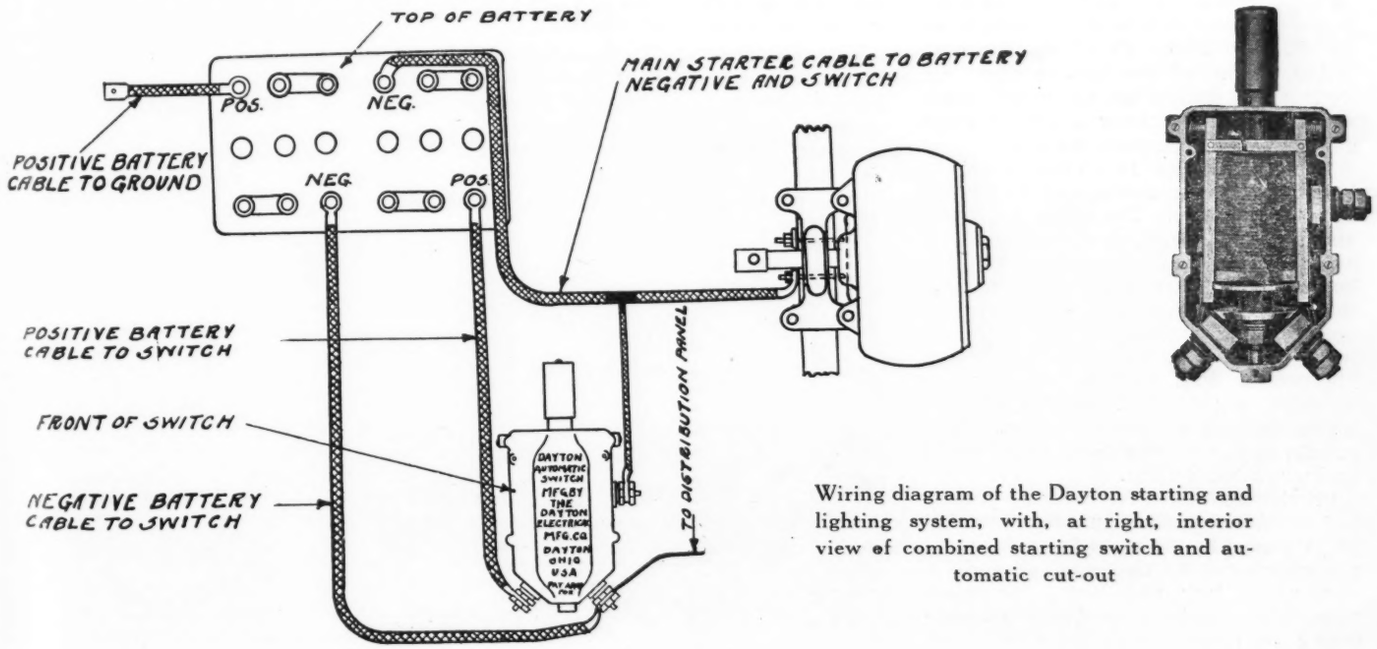
Completed armature

I. H. C. BUYS CHATTANOOGA PLOW

Chicago, June 14—The International Harvester Co. has purchased the Chattanooga Plow Co., maker of chilled plows. The Chattanooga Plow Co. was formed forty years ago and is being operated by the founders. Its plant covers about 3½ acres of a 7-acre site. The line of horse and power cane mills established by the Chattanooga company will be continued by the Harvester company.

ENTER MARTIN-PARRY CORP.

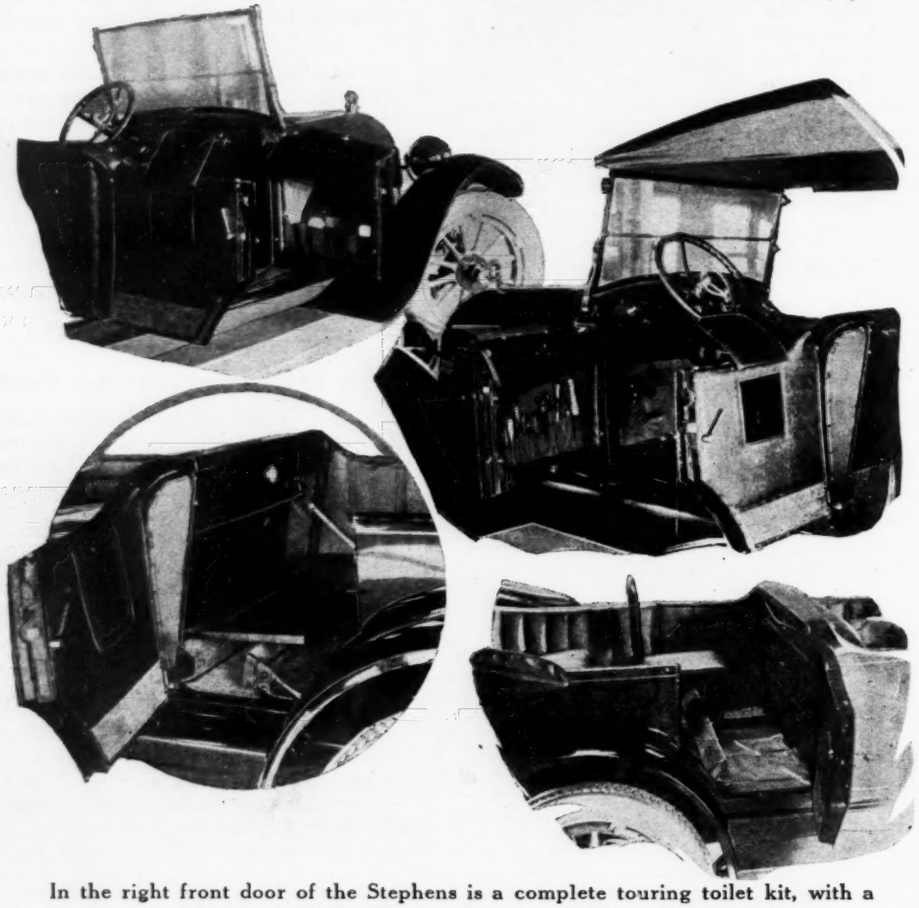
Indianapolis, Ind., June 14—The Martin-Parry Corp. has taken over the business and plants of the Parry Mfg. Co. of this city and the Martin Truck & Body Corp., York, Pa. Both plants will be operated, with general offices in New York. F. M. Small, formerly president of the Martin company, is president of the new concern, while John J. Watson, Jr., owner of the Martin, is chairman of the board. A complete line of car and truck bodies will be made.


TOP OF BATTERY
MAIN STARTER CABLE TO BATTERY NEGATIVE AND SWITCH
POS.
NEG.
POSITIVE BATTERY CABLE TO GROUND
NEG.
POS.
POSITIVE BATTERY CABLE TO SWITCH
FRONT OF SWITCH
NEGATIVE BATTERY CABLE TO SWITCH
TO DISTRIBUTION PANEL
DAYTON AUTOMATIC SWITCH MFG BY THE DAYTON ELECTRIC MFG. CO DAYTON OHIO U.S.A.

Wiring diagram of the Dayton starting and lighting system, with, at right, interior view of combined starting switch and automatic cut-out

Stephens Post-War Models in Open Cars

Line Is Fitted to Improved Salient Six Chassis— Delivery to Dealers July 1



In the right front door of the Stephens is a complete touring toilet kit, with a complete tool kit in the left. The new auxiliary seats have as much room as the front seats and extend far under the front seat, neatly folding away. Other details as to square doors, etc., can be seen in the group above

THREE post-war models in open bodies, with refinements and improvements in the Stephens Salient Six chassis, make up the new series 80 of the Stephens Motor Works of the Moline Plow Co. Delivery to dealers on these will begin about July 1, and later a luxury coupe and sedan will complete the line.

The new series is characterized by longer and lower bodies and larger and roomier interiors. The doors are wider and square finished, the windshield set at a perky tilt and with rain vision. The hood is high, narrow and tapering into the body. Upholstery is of genuine leather, French pleated. The seats are lower and deeper, the upholstery is double padded with real curled hair and mounted on Marshall cushion springs. Thick rugging covers the floor. Body panels, dash and instrument board are of quarter-sawed walnut.

Provision is made for carrying parcels and so on, and in addition a touring toilet kit is placed in the right front door and a complete tool kit in the left front door, both under lock and key. The usual features of Stephens custom body fashioning are present, with the anti-squeak shim running the entire length of the frame one detail. The sides of the car are low and slope gracefully toward the rear, ending with a rounding dip continued by the fenders and frame.

The rear body of the roadster, model 82, contains two large parcel and baggage compartments, one with side door opening. It is fitted with hand-tailored snug top and wind-sweep side curtains. The standard color is olive drab.

The four-passenger touring speedster, model 84, presents a narrow, long, low fuselage-type body built for speed and touring comfort. It is equipped with semi-victoria hand-tailored top and has a walnut-paneled compartment in the rear of the front seat 32 by 37½ by 4 in., equipped with robe rail and lock. Its standard color is Saginaw red.

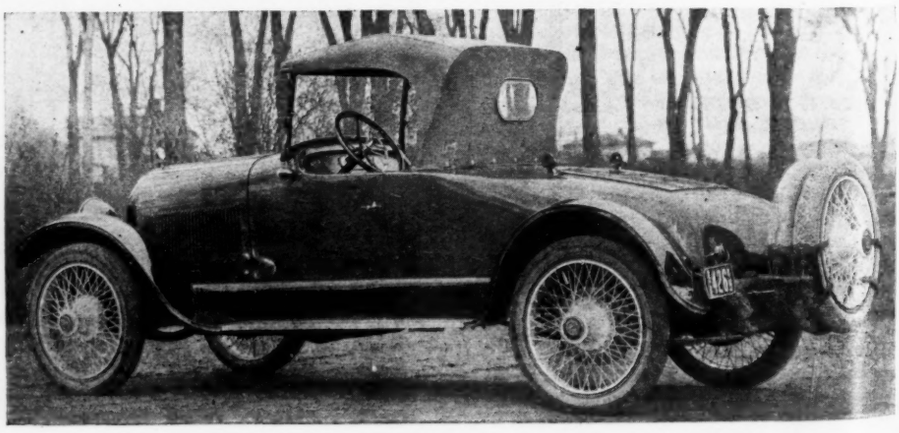
The six-passenger touring car, model 86, has the same general appearance as the four, except the body is considerably longer. It has a standard hand-tailored touring top and is in Stephens blue.

The chassis retains the perfected overhead-valve engine used on other Stephens models and described previously from time to time in these columns. However, the equipment has been changed somewhat. Starting, lighting and ignition is Auto-lite instead of Delco, with a USL battery instead of Willard. The oil pump has been located in the sump, where it runs in oil, affording direct oil feed to all bearings and requiring no priming. The pump is shaft-driven from the camshaft, varying the oil feed according to the speed of the engine. Another refinement is an enlarged bearing surface on the pistons between the second and third rings, affording better compression, steadier action and less wear. The wristpins are bronze bushed.

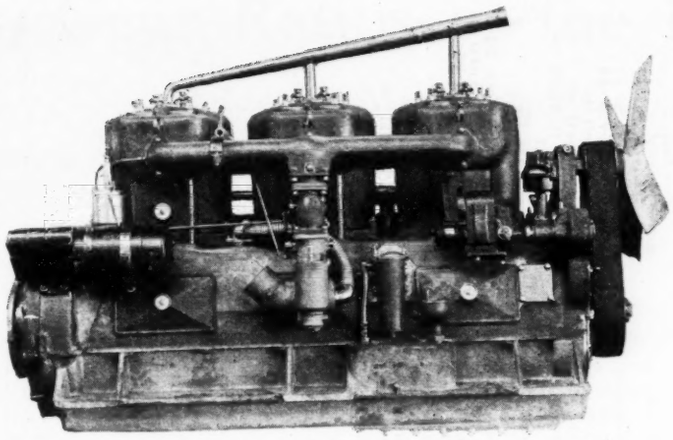
Springs Are Underslung

The rear springs are underslung, permitting lower body and lowering of weight. The weight below the springs has been reduced to a minimum, and the weight above the springs distributed equally on the four wheels. The wheelbase has been lengthened 4 in., and the frame is correspondingly stronger and longer and compensates the considerably longer post-war bodies. The new design lowers the rear of the frame and gives a lower body and greater riding comfort.

Several improvements have been made also in the semi-floating rear axle. There is a new one-piece pressed-steel axle housing with positive oil-locking construction and spring seats riveted on the main carrying housing. The Brown-Lipe-



The two-passenger Stephens roadster which has two large compartments



The Sterling engine is designed for heavy-duty vehicles

Chapin gears are a separate unit and can be inserted or removed without dissembling the rear system. The ten-spline axleshaft construction is used instead of the key construction, driven by spiral bevel gear. The axleshafts also are removable without disturbing associated parts.

Bock roller bearings are used throughout, seven sets in the rear axle. Double thrust bearings are used in the hubs. The brake rods now run directly back from the pedals and operate on arms from near the center of the axle housing. Neat spring-cap oil cups replace the grease cups on the spring bolts. The gasoline tank is enlarged to 20-gal. capacity and is reinforced to prevent collapse or bulge. It is at the rear of the frame and in a protected position, with straight filler pipe in place of curved. Boyce Moto-Meter, Stewart-Warner speedometer, Fedders radiator and new type Stanweld rims are used.

Sterling Tractor Engine

THE Sterling four- and six-cylinder tractor engines made by the Sterling Engine Co., Buffalo, N. Y., are a development of the Sterling marine engine which was in tank and heavy tractor service during the war. They are designed for heavy-duty work, being made with a bore and stroke 5½ by 6¾ in., the four developing 100 hp. at 1400 r.p.m. and the six, 150 hp. at 1500 r.p.m.

The lower base construction is designed for ready mounting for tractor work and is extremely rigid to withstand rough travel. Upper and lower crankcase are cast of semi-steel, the upper base being so bridged that all the explosion stress is taken by the trussed structure. The cylinder castings are waterjacketed, the jacket being tapered to obtain uniform cooling. The crankshaft is 2½ in. in diameter, drop-forged from chrome nickel steel. It is provided with counterweights opposite each throw, so a revolving balance is maintained. It is claimed this insures a smoother running engine, reducing vibration to a minimum and, since a film of oil about the bearings is constant, there is less friction and wear, the torque is more even and power and speed are increased.

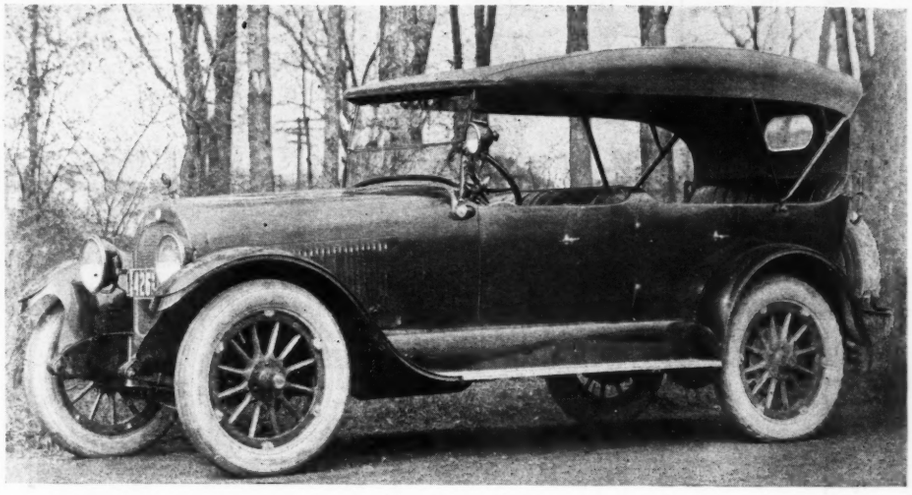
The main and connecting rod bearings on the four-cylinder total 200.23 sq. in., the connecting rod bearings being 3½ in. long, the intermediate bearing 4 in. and the end bearings 3¾ in. long. The intermediate and connecting rod bearings on the six are identical with those on the four, the end bearings on the six being 4⅞ in. long, with a total bearing surface of 305.86 sq. in.

The crankshaft is supported in the upper crankcase and held in place by drop-forged bearing caps, readily taken up through handhole plates on each side of the base. Drop forgings are employed for such parts as camshafts, crankshaft gear and camshaft gears.

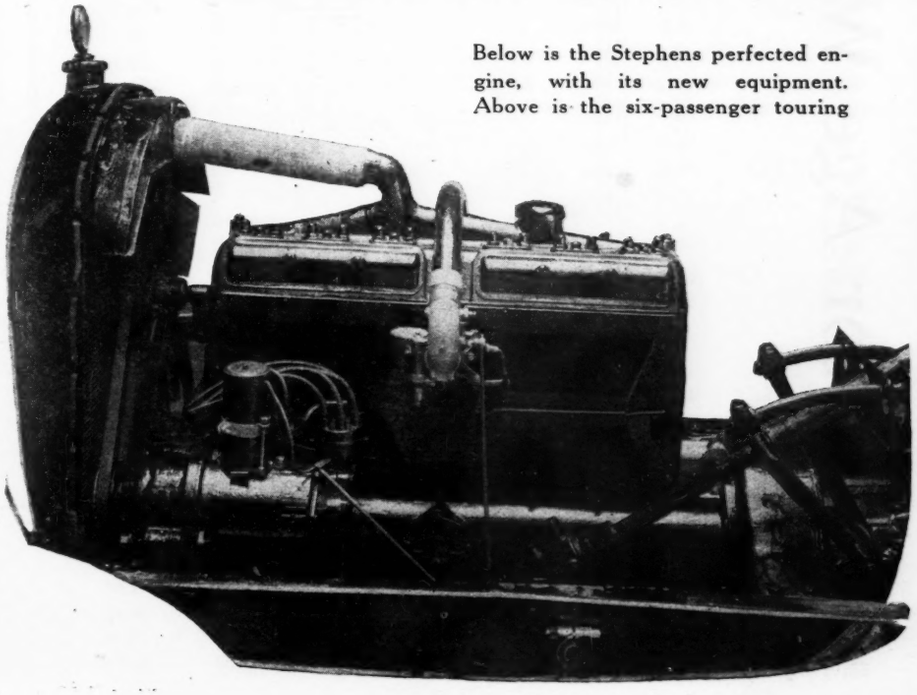
Lubrication is by force feed, oil being pumped to main and connecting rod bearings through the crankshaft under a pressure of about 15 lb. This pressure is controlled by a patented device so it will vary from high pressure with full load to minimum pressure with idle engine.

Ignition is by Atwater Kent distributer and single-spark dual magneto, operated separately or otherwise. A 24-volt starter and 24-volt generator with storage battery are part of the regular equipment. A flange on the flywheel end of the engine facilitates attachment to clutch, etc.

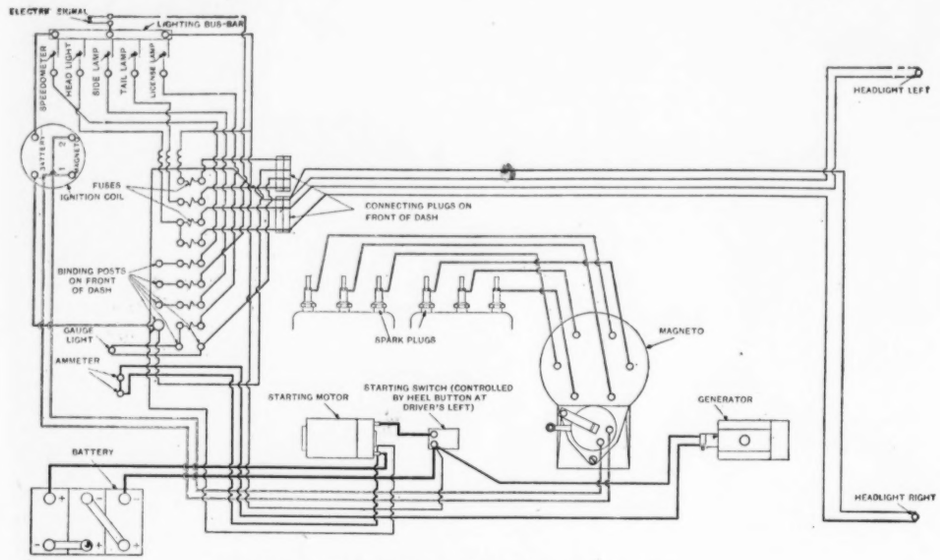
The engine is recommended for hauling heavy loads on rough roads, extensive farm work, for towing a series of gang plows, auxiliary power in locomotives, railway coach drives or for hauling in connection with excavating work.



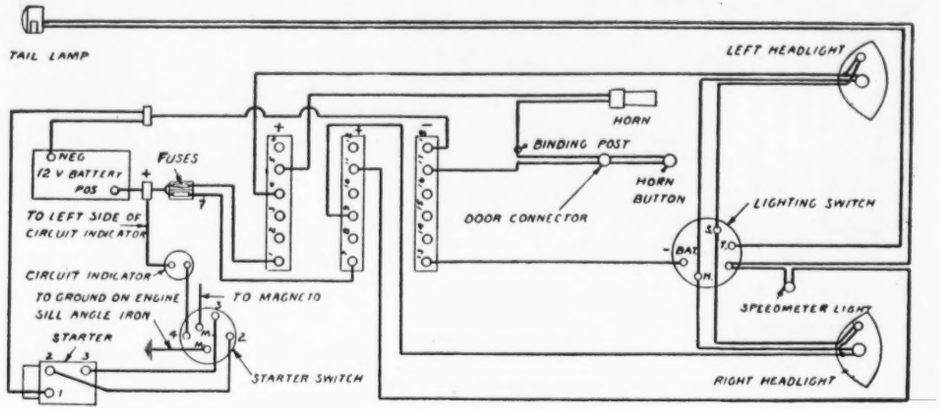
Below is the Stephens perfected engine, with its new equipment. Above is the six-passenger touring



Motor Age Wiring Diagram Chart No. 33

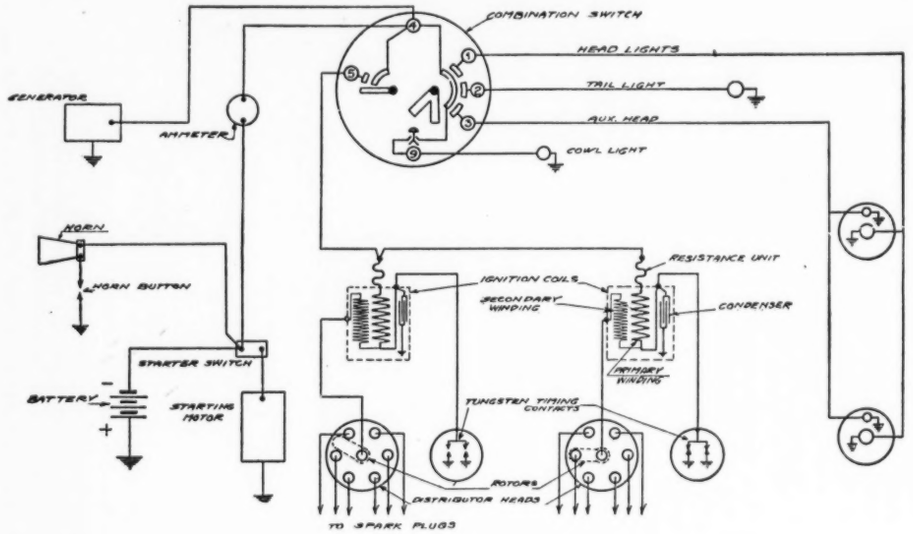


Packard with interior lights for closed cars



The 12-volt system on 1917 Franklin

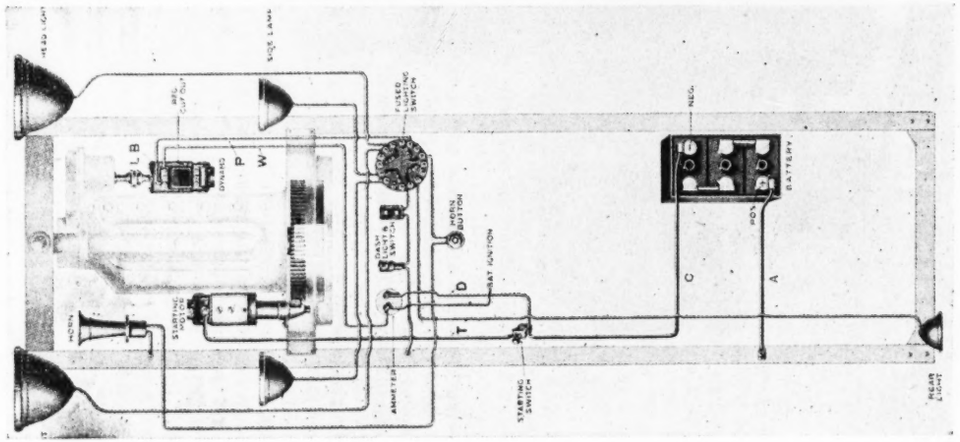
This Week—Packard—Franklin—National



Delco on National twelve

Abbott—March 20-27
Alco—April 24
Alter—Nov. 4
Apperson—March 6
Buick—Nov. 21-April 3
Cadillac—Dec. 9
Cartercar—May 1
Cole—Jan. 23-April 3
Case—Feb. 27
Chalmers—Feb. 20
Chandler—April 3
Chevrolet—Nov. 28-Mar. 27
Davis—May 8
Detroiter—March 6
Dodge—Dec. 12
Dort—March 13
Elgin—Feb. 27
Empire—March 13
Ford—Jan. 30
Grant—Feb. 27-March 27
Henderson—April 3
Hudson—Dec. 5-May 1
Hupmobile—Feb. 13
Interstate—March 13
Krit—Feb. 6
Lexington—April 24
Little—March 20
Locomobile—Jan. 23-April 17
Maxwell—Jan. 16
Marion—March 6-20
Mercer—Jan. 23
Michigan—March 20
Mitchell—Jan. 9
Murray—May 1
Oakland—Jan. 2
Oldsmobile—Jan. 23
Overland—Nov 7-14
Premier—April 10
Pullman—April 10
Regal—Feb. 6-April 10
Reo—Feb. 27
Saxon—April 17
Simplex—April 17
Scripps-Booth—Dec. 26
Stearns-Knight—April 24
Studebaker—April 26
Velie—April 24
Westcott—May 8

Special Systems for Fords—May 15-22
General Battery Charging—May 29
General Magneto Diagrams—June 5



Gray & Davis on 1915 National

Gear Ratios of the Motor Cars

Motor Age Maintenance Data Sheet No. 41

One of a series of weekly pages of information valuable to service man and dealer—Save this page

1917 Models

	FIRST SPEED	SECOND SPEED	THIRD SPEED	FOURTH SPEED	Reverse
Allen 37	12.00	6.75	4.00	....	14.00
Apperson	15.93	9.46	4.64	....	22.04
Bour-Davis 17 & 17B	14.14	8.28	4.42	....	17.15
Brewster	14.88	7.1	4.25	....	18.15
Briscoe 4-24	12.42	8.01	4.23	....	16.86
Cadillac 55	15.21	7.56	4.37	....	18.05
Case T	18.60	7.64	4.00	....	20.00
Chalmers 35A	16.00	9.02	4.75	....	21.50
Chalmers 35B	17.50	10.00	5.18	....	23.50
Chandler 21	11.92	7.57	4.4	....	15.60
Chevrolet 490	12.18	6.50	3.67	....	15.41
Chevrolet F	15.38	7.44	4.25	....	17.34
Cole 860	14.77	8.10	4.45	....	19.36
Columbia A & B	10.26	7.60	4.75	....	10.26
Crow-Elkhart	15.3	6.8	4.25	....	19.25
Cunningham V-2	16.36	7.18	4.08	....	20.13
Daniels A & B	14.72	7.42	4.42	....	19.22
Davis H	16.61	8.00	4.58	....	16.61
Davis J	16.00	7.73	4.58	....	16.00
Dispatch G	15.00	9.00	4.50	....	15.00
Dixie Flyer LX	14.25	8.9	4.75	....	17.1
Dodge Brothers	19.44	7.99	4.17	....	19.44
Dort 9	13.7	9.00	4.07	....	18.00
Elcar	12.40	7.14	4.08	....	16.25
Elgin Series F	13.81	7.96	4.50	....	18.00
Ford T	9.96	3.63	....	....	14.54
Franklin Series 9	12.34	6.78	3.92	....	13.23
Glide 6-40	15.51	7.23	4.64	....	19.38
Grant	....	....	4.50	....	....
Harroun	13.6	9.36	4.00	....	17.76
Hatfield A	13.50	8.03	4.50	....	16.29
Hudson H	14.90	8.87	4.90	....	18.08
Hudson	13.54	8.06	4.45	....	16.44
Hudson	12.41	7.39	4.08	....	15.07
Hudson	11.46	6.82	3.77	....	13.89
Hudson	10.63	6.33	3.50	....	12.92
Hupmobile N	16.70	8.35	4.64	....	19.49
Jones 26	12.47	7.92	4.45	....	16.00
Jordan B	14.30	8.36	4.47	....	17.34
Klinekar 6-38	12.19	7.06	4.50	....	15.97
Liberty 10-B	15.2	8.9	4.75	....	18.43
Locomobile M & H	15.4	7.4	5.4	3.85	21.8
Maibohm A	12.92	7.43	4.25	....	14.87
Maibohm B	13.68	7.87	4.50	....	15.75
Marmon 34	12.4	6.01	3.69	....	15.94
Maxwell 25	10.51	6.22	3.58	....	14.30
McFarlan X	11.79	5.27	3.50	....	15.51
Mercer	11.91	6.88	4.72	3.22	10.3
Mercer	14.32	8.23	5.67	3.87	12.4
Mercer	13.39	7.69	5.30	3.62	11.6
Mitchell C-42 & D-40	14.51	7.72	4.41	....	20.55
Moline-Knight C	13.93	7.05	4.30	....	17.15
Moline-Knight G	12.96	6.56	4.00	....	16.20
Moon 6-43	14.25	9.02	4.75	....	17.24
Moon 6-66	14.32	7.20	4.42	....	17.90
National A F & A K	12.68	7.60	4.58	....	16.48
Oakland 34	13.90	....	4.50	....	17.91
Oldsmobile 37	14.15	7.92	4.58	....	18.23
Oldsmobile 45	16.53	8.66	4.92	....	21.25
Overland 85	12.21	7.36	4.00	....	15.70
Overland 85	11.27	6.80	3.69	....	14.49
Overland 85	10.46	6.31	3.43	....	13.45
Overland 85	13.32	8.03	4.36	....	17.13
Overland 85	14.15	8.53	4.63	....	18.20
Overland 90	12.96	7.20	4.00	....	13.89
Overland 90	14.04	7.80	4.33	....	15.04
Overland 90	12.03	6.69	3.71	....	12.97
Packard	14.89	7.24	4.36	....	19.8
Paige 6-51	17.41	8.83	4.36	....	23.19
Paige 6-51	17.43	8.84	4.36	....	23.22
Paige 6-51 Special	18.49	9.39	4.69	....	24.64
Paige 6-39	17.60	8.93	4.42	....	23.45
Paige 6-39 Special	18.69	9.48	4.75	....	24.89
Peerless 56	16.31	8.23	4.9	....	21.07
Phianna M	14.6	7.90	5.8	4.3	18.8
Pierce-Arrow 38	13.69	7.83	5.75	3.53	16.49
Pierce-Arrow 38	14.66	8.39	6.16	3.78	17.61
Pierce-Arrow 38	15.52	8.88	6.52	4.00	18.64
Pierce-Arrow 48	13.20	7.09	5.44	3.3	16.27
Pierce-Arrow 48	14.12	7.59	5.82	3.53	17.40
Pierce-Arrow 48	15.12	8.12	6.23	3.78	18.63
Pierce-Arrow 66	9.97	6.04	4.19	2.57	12.10
Pierce-Arrow 66	10.47	6.34	4.40	2.7	12.71
Pierce-Arrow 66	11.17	6.76	4.69	2.88	13.56
Pilot 6-45	11.8	8.00	4.75	....	14.7
Premier 6B	14.24	8.34	4.45	....	17.27
Reo	15.80	7.70	4.30	....	21.50
Roamer R4-6-45	11.97	6.94	4.42	....	15.68
Roamer C-6-54	11.04	6.40	4.07	....	14.62
Saxon B5	16.30	9.12	5.00	....	20.6
Saxon S4	14.58	8.38	4.75	....	19.0
Scripps-Booth	15.93	8.50	4.80	....	20.21
Seneca A	12.8	6.88	4.00	....	15.52
Simplex	8.47	5.89	4.20	3.00	11.49
Standard	12.07	6.99	4.45	....	15.80
Stearns SKL4	13.5	7.5	4.5	....	16.7
Stearns SK8	14.3	8.0	4.7	....	17.6
Stephens 60-65	15.39	7.88	4.75	....	19.76
Studebaker 4	14.06	8.00	4.00	....	19.02
Studebaker 6	13.05	7.41	3.71	....	17.69
Velie 28	13.38	8.04	4.33	....	16.75
Velie 27	6.73	4.08	3.42	13.87	17.75
Westcott S-17	14.89	8.87	4.9	....	18.13
Westcott S-18	14.72	7.43	4.45	....	19.27
Willys-Knight 88-4	17.23	9.93	4.30	....	20.10
Willys-Knight 88-4	16.00	7.36	4.00	....	18.66
Willys-Knight 88-4 & 8	18.66	8.59	4.67	....	21.78
Willys-Knight 88-4 & 8	20.00	9.20	5.00	....	23.33
Willys Six 86 & 89	12.21	7.36	4.00	....	15.70
Willys Six 89	11.27	6.79	3.70	....	14.49
Winton 22	13.46	6.52	4.08	3.20	16.05
Winton 22-A	14.68	7.12	4.45	3.49	17.53

The Accessory Corner

New Fitments for the Car

Pedrick Piston Ring

THE Pedrick piston ring, developed by the Wilkening Mfg. Co., Philadelphia, Pa., is a slotted ring of the old type. The pressure-retaining features are not in the joint but in the ring itself. The company claims 98 per cent of the leakage by a ring is by the side and that only 2 per cent is by the joint. The ring is fitted in a template and ground to fit this perfectly before leaving the factory.

Tire Lock

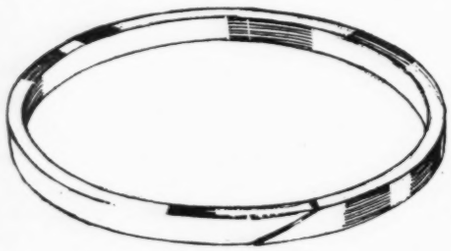
A new tire lock has been developed by Mack & Sitzenberg, Security building, Los Angeles, Cal. The lock clasps around the spoke of the wheel, over the tire and then is locked into position. The car can be pushed a short distance with this lock on and thus conforms with the city ordinance where there are restrictions as to the kind of lock to be used.

Hudson Timer Brush

The Hudson Motor Specialties Co., Philadelphia, Pa., is introducing a new timer brush for Fords that gives a sliding contact to the timer brush and thus tends to keep the commutator surface smooth and free from pitmarks. The brush is installed in a few seconds, it is claimed. The price is 60 cents.

Ventilated Spark Plug

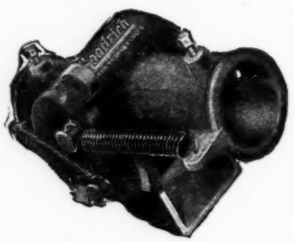
The Cammen Laboratories, 42 West Thirty-ninth street, New York, are introducing the Northwind ventilated spark plug. This plug has a bronze ball check valve that admits air into the combustion chamber during the intake stroke. This incoming air, coming into the cylinder by the porcelain, cools the porcelain and so eliminates the trouble due to breaking spark plugs, it is said.



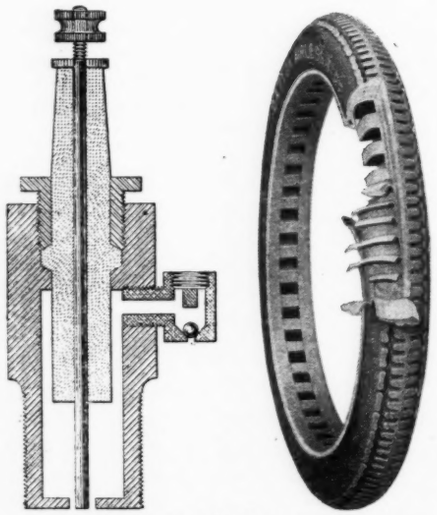
Pedrick piston ring

Goodrich steering lock

New tire lock for cars



Goodrich cut-out



Cammen spark plug, left, and Dayton airless tire

Wedge Rite Piston Ring

The Wedge Rite piston ring is one that expands in two directions, against the cylinder wall and against the edges of the groove in the piston. This action is produced by the three pieces, the center one acting as a wedge, forcing itself in between the two outer sections and thus spreading the ring apart. This center piece is made of untempered spring steel. The rings are made by the Wedge Rite Piston Ring Co., 278 Jefferson avenue, Detroit.

Dayton Airless Tire

The Dayton tire is of one-piece construction, having its airless portion built in with the outer carcass. The inner portions are made of soft resilient rubber pieces, all attached to one another. There is an air spare between the sections so that when an obstacle is encountered the rubber blocks flex, squeeze down and fill up the air spaces. The company claims that many of its customers have secured as much as 25,000 miles from the tires. The price is about the same as for a good cord tire. The tire is made by the Dayton Rubber & Mfg. Co., Dayton, Ohio.

Goodrich Cut-Out

The construction of the Goodrich cut-out is such that when the cut-out lever is depressed the gases in the exhaust pipe are all directed out through the opening made in the pipe. The operation of the valve is very much like that of the butterfly valve. Opening the cut-out raises the valve and allows it to rest against a ring shaped disc. This completely closes off the muffler and gives direct access to the opening. Manufactured by the Goodrich-Lenhart Manufacturing Company, Philadelphia, Pa.

Oil Seal Piston Ring

The No-Leak-O piston ring is constructed of one piece, has a steeped slot and is made with an oil-wiping groove around its lower edge. The groove is cut at a right angle to the face of the ring and then slopes way toward the bottom at an angle of 45 deg. It is claimed that this groove collects the oil which otherwise would pass up by the piston. The ring is made by the No-Leak-O Piston Ring Co., Baltimore, Md.

Rapid Change Wheel

A demountable wheel for Fords, made by the Rapid Change Wheel Co., Grand Rapids, Mich., enables the owner to change a wheel in case of a blowout or puncture in less than a minute, it is claimed. The wheel is equipped with a special hub which is removed with a wrench. The wheel can then be slid off the hub, the new wheel applied and the hub screwed back on. The set of wheel comes complete with a spare wheel carrier.

Service Equipment

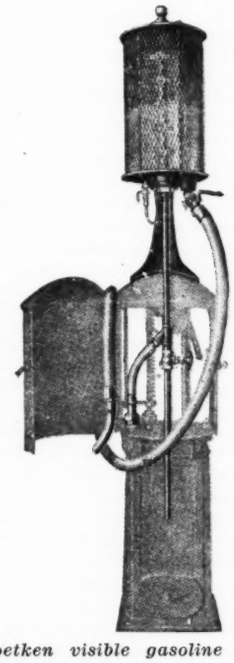
Time Savers of the Shop

Ampeco Wheel Puller

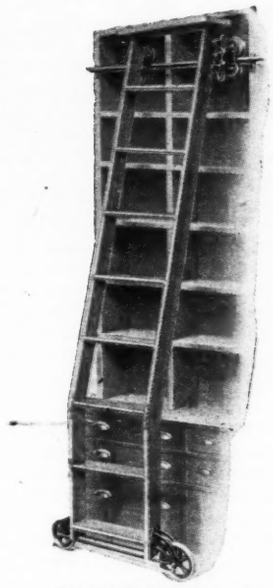
THE wheel puller made by the American Machine Products Co., Marshalltown, Iowa, is of malleable iron and very heavy in construction. The diameter of the hub attachment on the wheel puller is slightly adjustable by the set screw on the side of the cap. This allows it to fit wheels that have become worn and dented and at the same time to make a tight fit. The screw arrangement for pulling the wheel is furnished either with a set screw or a lever. The price with set screw arrangement is 48 cents and with the lever, 54 cents.

Groetken Visible Gasoline

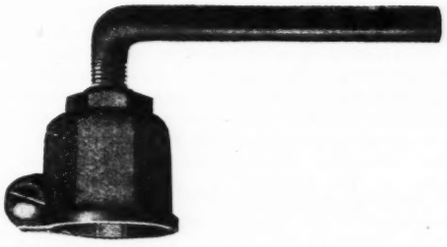
The Groetken Pump Co., Aurora, Ill., is making in addition to its regular line of visible gasoline pumps an attachment that makes any pump a visible fuel pump. The attachment is secured to the top of the pump as the illustration shows. The gasoline first is pumped to the glass dome, which is graduated, and then flows to the motor car's tank. The visible measuring dome in no way interferes with the operation of the pump. The glass graduate is protected with a heavy screen of fabricated screen. With the dome is furnished an electric light which illuminates the glass graduate at night and makes it more valuable because of the display effect.



Groetken visible gasoline pump



Side ladder for garages



Ampeco wheel puller

Piston Vise

The piston vise illustrated is manufactured by Campbell & Wochner, Rock Island, Ill. It can be adjusted to fit any size of piston from 2⅝ to 4½ in. in diameter. The surface of the piston is protected from being marred by the fiber facing. Means of securing the vise to the bench is provided through the bolt holes.

Side Ladder for Stock

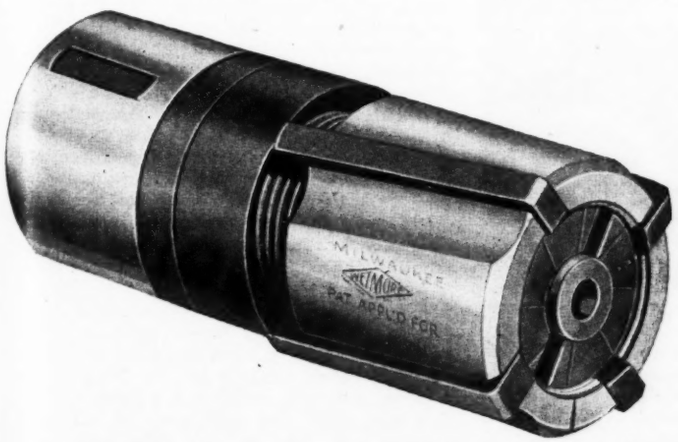
The up-to-date garage and service-station with its well equipped stockroom needs good furniture to go with the well-supplied bins. The Allith-Prouty Co., Danville, Ill., makes stockroom furniture as a specialty. The side ladder illustrated enables rapid survey of the stock bins. It is made for the style of shelving having an extended base. The company also makes a straight ladder for shelves without the base extension.

Billmont Master Wrench

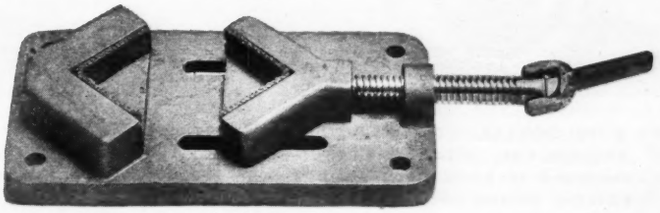
The Billmont wrench, made by the Edgar C. Guhart Co., 361 East Ohio street, Chicago, is designed to save the repairman's time. In the words of the maker, it "spins 'em off," and this is especially true of the nuts located in accessible places, like the ones on the rear main bearing of the engine. The handle of the wrench is knurled and is set at an angle with the socket end. This knurled portion can be held in one hand while the nut is spun off with the other hand.

Wetmore Reamer

The Wetmore reamer illustrated is adjustable and can be used for reaming out bearings, rebabbitted rods and the like. The cutter is equipped with a micrometer adjustment enabling it to be adjusted to 0.001 in. This setting feature can be secured accurate enough to make unnecessary the use of a grindstone for trueing up the reamer after the adjustment is made. One special wrench is all that is needed to set reamer to any size, and this wrench is part of the equipment.



Wetmore reamer for bearings, rebabbited rods, etc.



Piston vise which can be adjusted to fit any size

Among the Makers and Dealers

Short Trade Notes

BOYD Leaves Oakland Company—Frank R. Boyd has resigned as assistant treasurer of the Oakland Motor Car Co., Pontiac, Mich., and will devote his time to personal affairs.

McLaughlin Heads Canadian G. M.—R. S. McLaughlin, president of the McLaughlin Motor Car Co. and a vice-president and director of the General Motors Corp., has been elected president of the newly organized General Motors of Canada, Ltd., which has a capital of $10,000,000.

Columbia Buys Factory Site—The Columbia Motors Co. has purchased from the Detroit Seamless Tubes Co. 6 acres and will erect a new factory at once. The proposed plant will be completed by Jan. 1. It will have a floor space of 150,000 sq. ft. The cost of the new structure has not been announced. The company paid $200,000 for the site, part of which is now occupied by the Fisher Body Corp.

Fijux Now With Westinghouse—L. B. Fijux has been appointed Detroit district representative of the motor car equipment department of the Westinghouse Electric & Mfg. Co. T. G. Haugh will assist him. He succeeds W. A. Haines, who died last February. Mr. Fijux was assistant manager of the Willard Storage Battery Co. for six years and manager of the Detroit office of the Bijur Motor Appliance Co. for five years.

To Distribute Kalamazoo in Northwest—The Motor Sales & Finance Corp. has been organized at Sioux Falls, S. D., and has taken over the distribution of the Kalamazoo truck for the Dakotas, Minnesota, Nebraska and western Iowa. The concern is planning a vigorous sales campaign and will put 100 truck salesmen in the field to assist sub-distributers. The company will finance dealers to the extent of 80 per cent of the purchase price and sell trucks on the partial payment plan when desired. C. J. Johnson, vice-president and director of the Kalamazoo Motors Corp., is president of the distributing agency.

Willard Men in Iowa to Meet—The Willard battery station men of Iowa will hold a convention at Cedar Rapids June 12. Among the speakers will be A. J. Knapp, secretary of the Iowa Motor Trades Bureau, who will speak on organization.

Marshner Heads Detroit Branch—F. W. Marshner has been appointed manager of the Detroit branch of the New Departure Mfg. Co., Bristol, Conn., succeeding the late Samuel B. Dusinberre. He has been in the Detroit office of the company for nearly seven years.

Standard Parts Building Spring Plant—The Standard Parts Co. is building a new spring factory at Flint. It replaces the company's present Flint factory, so completely outgrown that it no longer supplies the requirements of Standard Parts customers in that city alone. The new plant will have a capacity four times greater than the old plant.

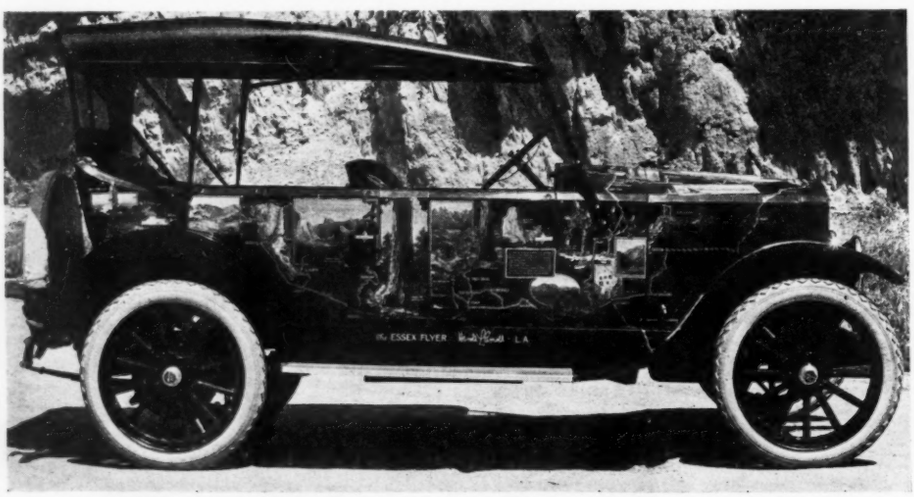
Iowa Dealers Rapidly Organizing—The Iowa Motor Trades Bureau, recently organized, is meeting with a ready response from the motor car dealers of the state and already has reached a considerable membership. Secretary A. J. Knapp made a two-week trip through eastern Iowa in the interest of the bureau and during his trip several county units were organized. The Marshal county dealers organized with G. M. Darling as president; Jack Dagget, secretary, and W. C. McCarten, treasurer. Mr. Knapp also organized the Buchanan county unit. A. C. Burkhart, of Independence, was made president; H. J. Walling, Jessup, vice-president, and H. B. Gill, Independence, secretary-treasurer. Dubuque county dealers will meet to perfect their county organization and the Clinton county dealers will organize also.

Kentucky Plans More Space—The Kentucky Wagon Mfg. Co. will begin Aug. 1 the construction of a new two-story steel and brick building costing approximately $100,000. Officials of the company say that the new building will assure speedy production, as modern carrier equipment will be installed. According to present plans the structure will be occupied by the motor car upholstering, paint and assembly departments, which are part of the motor car and truck branches. The plant of the company consists of thirty-two acres at the present time, but with the construction of the new building a much larger area will be necessary.

Oneida Truck Business Doubles—The Oneida Motor Truck Co., Green Bay, Wis., in the six months or more since the end of the war has more than doubled its production and increased its retail sales by 130 per cent. Business in May reached $185,000, or $70,000 in excess of the April volume. The business of November, 1911, amounted to $81,000 and the plant was engaged largely in the execution of a war contract for 1500 field kitchens and limbers. Within a short time after Nov. 11 the entire plant was converted back to peace business and from month to month has been obliged to make material increases in production schedules. During May sales rooms were established at Baltimore, Denver and Sioux City, and the sales organization generally extended.

Dort Helps Make Own Transmissions—J. W. Jenkins, general superintendent of the Dort Motor Car Co., Flint, Mich., and thirty-two machinists from the plant in that city, have returned to headquarters again after being engaged at Rockford, Ill., manufacturing transmissions. Concerns in Rockford which were handling contracts with Dort were compelled to suspend, due to a general strike. To avoid crippling the output of the Flint plant it was decided to send a force to Rockford and operate the machines there in turning out transmissions. The force produced on the average of 110 a day. The strike at Rockford is about over, 340 men returning to work June 1. The coming of the Flint machinists was not objected to by the strikers, and there was no conflict of any kind.

Wallis Tractor Resumes Operations—The Wallis Tractor Co., Racine, Wis., has resumed operations with a large force and on a greatly increased production schedule, after being closed down for a month, during which time the entire plant was overhauled and final work done on important changes to increase the economy and efficiency of processes. The Wallis company from now on is operating on a straight 8-hr. a day basis, without overtime. Rates have been established which take into consideration present living conditions, and the voluntary proposition is meeting with the approval of all employees. It was to put this plan into execution that the entire equipment of



A PICTORIAL TRAVELOGUE ON WHEELS—So Harold L. Arnold of Los Angeles, Cal., calls this decorated Essex on display in his salesrooms. It was designed to attract attention to the scenic wonders of the Southwest—the Painted desert, Petrified forest, Valley of Fire, giant Squoias, pueblos, Mount Lassen, Zion canyon and the great natural bridges of Utah. After its stay in Los Angeles the Essex will be sent over the route shown

tools and machinery was rearranged and much special equipment added to eliminate every trace of lost motion in the manufacture of tractors.

Unwin Now With Wilson—B. V. Unwin, until recently connected with the Commonwealth Brass Co., Detroit, has been appointed manager of the sales promotion department of the J. C. Wilson Co., Detroit.

Doran With Chevrolet Branch—E. J. Doran has been made service manager of the Detroit branch of the Chevrolet Motor Co. He comes from the aviation service, where he was in charge of testing and experimental work on Liberty engines at Morrow Field, Detroit.

Dort Representative for America—F. A. Petrie, director of sales of the Dort Motor Car Co. for the South American countries, will sail June 20 for Buenos Aires to establish export connections for the Dort car. He is taking with him Vaughn Green, engineer and service expert. He expects to visit Argentine, Uruguay and Chili and will make a careful survey of that field.

Maxwell to Enlarge Dayton Plant—Maxwell have placed contracts for about $75,000 worth of new equipment to be installed in the Dayton, Ohio, plant. A portion of the plant, the factory known as No. 3, will be devoted to foundry work. It is this factory in which the new machinery will be installed. The plant at Newcastle, Ind., will be continued in car manufacture.

Oakland Opens Des Moines Branch—The Oakland Motor Car Co. opened a factory branch at Des Moines, Iowa. The branch will control practically all Iowa except the east and west tier of counties. H. H. Mahaffey, who has been assistant manager of the Omaha branch, will be Des Moines manager. The Ideal Auto Co., which has been local distributer for Oakland, will have quarters with the factory branch.

Truck Dealer Expands Line—The Smith-Davis Machinery Co., Philadelphia, Pa., distributer in that territory for Bessemer trucks and Austin-Western road machinery, has taken on the Allis-Chalmers tractor. Demonstrations will be made at the Smith-Davis Machinery Co.'s farm at Meadow Brook, near Jenkintown, after which the tractor will be taken on a truck through New Jersey districts, a second truck with farm implements accompanying.

Canadian Plant Also for Wills—C. Harold Wills and John R. Lee, who are about to build a large plant at Port Huron, Mich., also will erect a Canadian branch at Sarnia, Ontario, directly across the St. Claire river from Port Huron. While no details of the Canadian plant are given at this time, Mr. Lee states that it will be located on a 250-acre site, south from Sarnia and directly across the river from Port Huron. The two plants will be connected by ferry service. The Canadian plant will employ approximately 2000 men and will manufacture the car complete.

Chief Motors to Increase Production—The Chief Motors Corp. has placed on sale 20,000 shares preferred and 20,000 shares of common stock. The par value of both stocks is $10. The company is raising additional capital to increase its production so enough engines may be produced to fill orders already received. The Chief Motors Corp. builds a kerosene-burning tractor engine and has assets totaling approximately $400,000, not including good-will, organization and other tangible assets. John Erd, formerly of the Erd Motor Corp., Saginaw, Mich., is president and general manager. The corporation has just opened sales offices in Detroit.

A GARAGE IN KEEPING WITH ITS TOWN—Pasadena, Cal., is a beautiful town and its garages are beautiful also, if any one may judge from this example. The front of the building is of gray brick. There is a salesroom in front and public garage in rear. Note the flower boxes at the windows and on the lawn. Thirty-five cars are the garage's capacity

Federal Tool in Merger—The Federal Tool & Stamping Co., Leland, Mich., has just taken over the Holland Lighting & Specialty Co., and the merged concern is known as the Federal Stamping Co. The capitalization is $25,000.

Moog to Handle Jenkins Spring—The St. Louis Vulcan Spring Co. has been incorporated to handle the Jenkins Vulcan spring. Hubert Moog, formerly state manager for Florida for the Jenkins, is manager.

Delco Light Holds Service Convention—Thirty Delco-Light service men from all parts of the United States and Canada met in convention in Dayton, Ohio, studying and discussing the latest developments in service work. One session was devoted to the assembly of the 3-kw. Delco-Light plant.

To Specialize on Making Pistons—O. H. Watkins and his son, Roy Watkins, Waterloo, Iowa, have formed a company to manufacture parts and will specialize on pistons and piston rings. The company has quarters in the Sharon manufacturing building at Waterloo, and orders have been placed for the machinery.

Culto-Tractor Is Delayed—The Detroit Culto-Tractor Co., Detroit, recently organized to market a light three-wheel gasoline farm tractor, will not be in production before September. The company recently purchased a manufacturing plant and must rebuild a large portion of it, which fact is causing the delay.

Woodworth Heads Providence Branch—Harold W. Woodworth, who has been in the Boston office of the Ahlberg Bearing Co., Chicago, will be in charge of the new office of the company at Providence, R. I. Edward A. Hefferman, recently returned from Naval aviation service, will have charge of the office of the Ahlberg Bearing Co., recently opened in Kansas City, Mo.

Changes Name to Show Business—The Mathews Carriage & Auto Co., Des Moines, Iowa, has filed amended articles of incorporation, changing the firm name and increasing the capital stock to $75,000. The company now will be known as the Mathews Truck Body Co.

St. Louis Distributer Branches Out—The Mississippi Valley Motor Co., Oakland distributer, St. Louis, Mo., will open a branch in Memphis, Tenn., as soon as a building to cost $60,000 is completed. A. J. Clayton, assistant manager at St. Louis, is to be manager of the branch.

Henderson to Handle Lexington Only—C. P. Henderson, formerly director of sales for the Cole Motor Car Co., who resigned to become a district sales manager of the Cole and Lexington cars in San Francisco, has given up the Cole and will devote his entire time to the Lexington.

To Represent Nemours in Michigan—Blood & Wright, who specialize in automotive service at Detroit, have been appointed exclusive representatives in Michigan for the Nemours Trading Corp. and are also Michigan representatives for the K. & S. lock. They are opening a sales and installation store in Detroit for lock business exclusively.

Standard Parts Vice-Presidents—Dan C. Swander and John G. Utz have been elected vice-presidents of the Standard Parts Co. Mr. Swander will continue as supervisor of sales and Mr. Utz as supervisor of engineering. Both men have been with the company since its organization. Mr. Utz was formerly director of engineering of the Perfection Spring Co. Mr. Swander was eastern sales manager of the Firestone Tire & Rubber Co.

From the Four Winds

Glimpses at the World of Motordom

THIS Truck Started Something—When a truck backfired while being repaired in garage at Sycamore, Ill., the plant was almost completely destroyed. A mechanic was seriously burned. Two trucks in the path of the flames were completely destroyed. The loss was estimated at $10,000.

12,713 More Cars This Year—There are 12,713 more cars in the District of Columbia this year than in 1918. During the last eleven months 38,878 license tags were issued, as compared with 26,165 in the same period for the preceding year. But 34,347 tags were issued during 1917-1918 less than the number in eleven months of this year.

Michigan Gets Trucks for Roads—Michigan's allotment of Army trucks for use in highway construction totals 229, or nearly three trucks to a county, and this number may be increased. Of the trucks 159 are to be shipped from distributing points at Cleveland, Indianapolis and Streetor, Ill. The remaining seventy were used in transport supply work. They will come from Camp Custer and New York.

Detroit Club Signboarding Road—The highway signboarding campaign recently inaugurated by the Detroit Automobile Club is making good progress. The road crew, which started out about two weeks ago, has completed about a third of the route to Chicago. This route, when completely marked, is to follow the Michigan-Detroit-Chicago highway from Detroit to Paw Paw. From that point it will go to Benton Harbor and St. Joseph and thence south to New Buffalo, Michigan City, Gary, Hammond and South Chicago.

New Iowa Fees Shock Owners—Owners of cars in Iowa recently got their first official announcement of what license fees would be under the road laws passed by the recent session of the Iowa legislature. For those owners who had not taken time to figure out their fees the announcement came something as a shock. The law bases the fee on 1 per cent of the valuation as fixed by the state executive council plus 40 cents for each 100 lb. of weight. The state highway commission has figured fees on this year's standard models of some of the leading cars as follows: Buick, $26.60; Cadillac, $49.40; Ford, $12 to $16; Hudson, $35.20; Dodge, $20.60; Locomobile, $71; Mercer, $61; Overland, $19.60; Packard, $69; Paige, $36; Peerless, $41; Pierce-Arrow, $82.40. Officials of the state department are preparing tables for use of the county treasurers in collection of fees to show what the registration fees will be on all cars as far back as 1913.

LOOKING BACKWARD NINETEEN YEARS—This photograph was taken nineteen years ago. It was taken in front of Rhode Island's first horseless carriage factory in Providence, which was operated by Hughes & Atkin, now the William Hughes Co., the oldest exclusive Reo car dealers in New England. This vehicle is one of the eighteen built by Mr. Hughes in 1899 and 1900, for which he made nearly all parts by hand. As late as fourteen months ago one of these cars was seen operating in Rhode Island.

Boston Motor Corps Demobilizes—After two years' intensive service, the Motor Messenger Service Corps of Boston, Mass., has been demobilized. The corps was formed in April, 1917. The drivers were nearly all society women and were the first of the many divisions of women in war work there to wear a uniform. During its service, the corps drove its cars 39,145 hr., carried thousands of tons of freight, thousands of passengers and many influenza epidemic patients. The corps was merged with the Red Cross in June of last year.

Every Third Man Owns a Car Here—There are reported to be close to 3000 cars at Elwood City, Pa., which contains 10,000 people, the majority being Fords, with Cadillacs and Packards next in order. This percentage would make every third person there an owner.

Toledo Club Wants 3000 Members—The Toledo Automobile Club has started a campaign for 3000 new members. A census was taken, and it was found that there were 25,000 owners in the county. During the week beginning June 20 each one will be asked to join the club. There are now 1800 club members. Two cars have been bought by the club to be kept on highway inspection within a radius of 200 miles of Toledo. The club is to put up signs on every main road within the 100-mile district and will re-mark danger crossings and points along the highway.

Coming Motor Events

MEETINGS

Ottawa Beach, Mich.	Society of Automotive Engineers	June 23-27

TRACTOR DEMONSTRATIONS

Wichita, Kan.	Automotive Committee of National Implement Assn.	July 14
Aberdeen, S. D.	Sectional Tractor Demonstrations	Aug. 18-22
Ottawa, Ont., Canada	Inter-Provincial Plowing Match and Tractor Demonstrations	October

RACES

Tacoma, Wash.	July 4
Cincinnati, Ohio	July 5
Uniontown, Pa.	July 19
New York	July 26
Elgin, Ill.	Aug. 22-23
New York	Aug. 23
Uniontown, Pa.	Sept. 1
New York	Sept. 20
Cincinnati, Ohio	Oct. 1

SHOWS

Indianapolis, Ind.	Automobile Trade Association	Sept. 1-6
Cincinnati, Ohio	Automobile Dealers' Association	Sept. 13-20
New York	N. A. C. C.	Jan. 3-10
Chicago	N. A. C. C.	Jan. 24-31